



ERAWATCH Country Report 2009

Analysis of policy mixes to foster R&D investment
and to contribute to the ERA

Bulgaria

Ruslan Stefanov, Zoya Damianova and Teodora Marinova



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ERAWATCH COUNTRY REPORT 2009: Bulgaria

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investment and to contribute to the ERA**

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Executive Summary

As highlighted by the Lisbon Strategy, knowledge accumulated through investment in R&D, innovation and education is a key driver of long-term growth. Research-related policies aimed at increasing investment in knowledge and strengthening the innovation capacity of the EU economy are thus at the heart of the Lisbon Strategy. This is reflected in guideline No. 7 of the Integrated Guidelines for Growth and Jobs. This advocates increasing and improving investment in research and development (R&D), with a particular focus on the private sector. This report aims at supporting the mutual learning process and the monitoring of Member States efforts. Its main objective is to characterise and assess the evolution of the national policy mixes in the perspective of the Lisbon goals, with a particular focus on the national R&D investments targets and on the realisation and better governance of the European Research Area. The report builds on the analytical country reports 2008 and on a synthesis of information from the ERAWATCH Research Inventory and other important available information sources.

Bulgaria falls short of both the EU average in R&D funding as a percentage of GDP (GERD) and in the percentage of the funding coming from the private sector (BERD). Compared with the Lisbon Strategy objectives this deficiency is even more striking, and there is no evidence to support a significant positive change in current trends. Attempts to raise the levels of financing in the scientific and technological sectors, both private and public, have been implemented. However, the efficient use of financial instruments in addressing Lisbon related deficiencies faces serious problems. During the ongoing economic crisis, the objectives outlined in the Lisbon Agenda have been reaffirmed and even deepened by the European Economic Recovery Plan. The Commission's initiative indicates that those economies, which invest in education and innovation, emerge from the crisis stronger than those economies that cut back on these investments (Innovation.BG 2009).

One of the enduring problems in Bulgaria is the high percentage of R&D funding which comes from the public sector in the form of direct budgetary aid: 61.9% in 2006. In the same year private enterprises contributed only 30.6% of R&D funding (Country RTD Data, EUROSTAT Statistical Books 2009). Bulgarian firms do not collaborate with public research institutions on their innovation projects citing prohibitive costs and minimal benefits from producing knowledge-intensive products for an unsophisticated consumer base with low demand pull potential (Innovation.BG 2009). The dominance of public funding in research activities is indicative of problems in both the efficiency and utility of research in stimulating economic growth in Bulgaria, as well as of an unhealthy relationship between publicly funded research on the one hand, and the technological absorptive capacity of private sector firms on the other. As public and private finances come under continuous strain in the course of the current global financial and economic crisis R&D spending might slip even lower in Bulgaria though the Bulgarian government has vowed to preserve public R&D volume.

Barriers to R&D investments	Opportunities and Risks generated by the policy mix
Insufficient number of adequate funding instruments and weak coherence between NIF and NSF	<p>O: Diversification of the instruments of NSF and NIF to support public and private R&D projects; co-funding of projects supported by FP7 and CIP; joint priorities of NIF and NSF to ensure continuity in support.</p> <p>R: As of result of weak collaboration between publicly funded institutions, and lack of a coherent national research strategy with clear R&D priorities, increases in direct governmental aid does not result in higher R&D outputs.</p>
Lack of human resources	<p>O: Increase in educational and OP financing to develop human resources; good number of support measures for researchers launched in 2008 and the first quarter of 2009, their efficiency is still to be seen.</p> <p>R: The number of schemes aimed at supporting R&D personnel in the universities and the research institutes is much higher than that aimed at companies, which might further deepen the misbalance between the public and the private sector.</p>
Lack of links between industry, educational institutions, and public research centres	<p>O: NSF and NIF support the linkages between these stakeholders and the creation of research centres of excellence and clusters to facilitate the exchange of information. Their impact will be strengthened should according to the proposed draft R&D strategy for the period 2008 – 2018 the two funds merge in a single national fund for research and innovation.</p> <p>R: The merger of the two national R&D funds, proposed in 2008, might delay the release of new calls until administrative and political issues be resolved. This might result in redirecting beneficiary companies towards OP Competitiveness, leading to unwanted substitution of national for EU R&D funding.</p>
Lack of venture capital	<p>O. The launch of OP Competitiveness as well as existing opportunities under the JEREMIE programme have shaped expectations that VC funds will be created, which might help lure private investors. Soft measures could be implemented through OP Competitiveness to build the capacity of the potential applicants.</p> <p>R: Lack of critical mass of VC fundable private sectors projects due to high risk-aversion among entrepreneurs and the lack of traditions and trust to work with VC funds.</p>
Underdeveloped research and innovation infrastructure and services	<p>O: MES has done some preparatory work in preparing the national research infrastructures map, which can lead to funding of pilot projects for research infrastructures already in 2009 and 2010 through OP Competitiveness.</p> <p>R: Bulgarian companies are still unwilling to use R&D and innovation services. Focus in OP Competitiveness is strongly placed on physical infrastructure and much less on services, which might result in a misbalance between infrastructure availability and its usage in the future.</p>

The development of an effective policy mix to address the identified barriers to R&D investment in Bulgaria is still in its infancy. Despite some recent shifts towards redirecting funding and objectives towards strategic priorities, the recent implementation of these policies has not yielded significant results. As their implementation begins to catch up with their formulation, beneficial change is expected. In particular, much promise can be expected in raising the levels of innovation within enterprises that currently do not perform or perform very little R&D. This will be aided by significant linkages between the public and private sector and increase in innovation within both private and public research centres.

	Short assessment of its importance in the ERA policy mix	Key characteristics of policies
Labour market for researchers	<ul style="list-style-type: none"> • The mobility of researchers is of high importance in ERA • Attracting a new generation of researchers to work in Europe, incl. from third countries, will support the knowledge generation processes • Transferability of social security payments from one country to another is to facilitate the mobility of researchers 	<ul style="list-style-type: none"> • Bulgaria has achieved good harmonisation of its national with the EU policy • Gender balance and non-discrimination approach are important features of the national policy • New schemes were launched in the country under the National Science Fund and OP Development of Human Resources to strengthen the country's research potential • Special measures have been launched to stimulate young researchers in the country
Governance of research infrastructures	<ul style="list-style-type: none"> • The development and approval of a legal framework on research infrastructures at the EU level is of primary importance for Europe • Sustainability of the management of the research infrastructures and ensuring open access to researchers 	<ul style="list-style-type: none"> • Recognised as a national priority in the last 2-3 years • National Roadmap is under development, currently in the process of validation • National long-term policy on research infrastructures is missing • Bulgaria is lagging behind in upgrading of the research infrastructure, though a substantial number of projects have been supported under targeted calls for proposals. • Lack of financial, industrial and human potential for the construction and maintenance of big research infrastructures. • Bulgaria has the potential to be part of Europe-wide distributed research infrastructures.
Autonomy of research institutions	<ul style="list-style-type: none"> • Greater autonomy of universities • Intensifying knowledge transfer • Strengthening the link science-business • Better management to ensure better competitiveness in R&D 	<ul style="list-style-type: none"> • Additional support to the universities is needed to intensify their research activities • Financial stimuli are in place in recent years – programmes of the National Science Fund on a competitive basis
Opening up of national research programmes	<ul style="list-style-type: none"> • Very important considering the fragmentation of research activities in Europe, which results in duplication of research tasks and loss of research potential • Coordination between the different programmes is needed • Stronger focus on the ERA-NETs • Identification of joint research priorities of different member states 	<ul style="list-style-type: none"> • Lack of research priorities in this domain • Good participation in the ERA NET and ERA NET+ schemes • The future involvement of the country in the ERA NET schemes and programmes under Article 169 is important to be in line with the national priorities so as to achieve greater effect • The national research programmes are open for participation of individual foreign researchers (from both EU and non-EU countries) and part of their costs related to training and participation in seminars can be covered. This is implemented on a project-by-project basis.

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1 Introduction

As highlighted by the Lisbon Strategy, knowledge accumulated through investment in R&D, innovation and education is a key driver of long-term growth. Research-related policies aimed at increasing investment in knowledge and strengthening the innovation capacity of the EU economy are thus at the heart of the Lisbon Strategy. This is reflected in guideline No. 7 of the Integrated Guidelines for Growth and Jobs.¹ This advocates increasing and improving investment in research and development (R&D), with a particular focus on the private sector. For the period 2008 to 2010, this focus is confirmed as main policy challenge and the need for more rapid progress towards establishing the European Research Area, including meeting the collective EU target of raising research investment to 3% of GDP, is emphasised.

A central task of ERAWATCH is the production of analytical country reports to support the mutual learning process and the monitoring of Member States' efforts in the context of the Lisbon Strategy and the ambition to develop the European Research Area (ERA). The first series of these reports was produced in 2008 and focused on characterising and assessing the performance of national research systems and related policies in a comparable manner. In order to do so, the system analysis focused on key processes relevant for system performance. Four policy-relevant domains of the research system have been distinguished, namely resource mobilisation, knowledge demand, knowledge production and knowledge circulation. The analysis within each domain has been guided by a set of generic "challenges", common to all research systems, which reflect possible bottlenecks, system failures and market failures which a research system has to cope with. The analysis of the ERA dimension still remained exploratory.

The country reports 2009 build and extend on this analysis by focusing on policy mixes. Research policies can be a lever for economic growth, if they are tailored to the needs of a knowledge-based economy suited to the country and appropriately coordinated with other knowledge triangle policies. The policy focus is threefold:

- An updated analysis and assessment of recent research policies
- An analysis and assessment of the evolution of national policy mixes towards Lisbon R&D investment goals. Particular attention is paid to policies fostering private R&D and addressing its barriers.
- An analysis and assessment of the contribution of national policies to the realisation of the ERA. Beyond contributing to national policy goals, which remains an important policy context, ERA-related policies can contribute to a better European level performance by fostering, in various ways, efficient resource allocation in Europe.

¹ COM(2007) 803 final, "INTEGRATED GUIDELINES FOR GROWTH AND JOBS (2008-2010)", http://ec.europa.eu/growthandjobs/pdf/european-dimension-200712-annual-progress-report/200712-annual-report-integrated-guidelines_en.pdf

2 Characteristics of the national research system and assessment of recent policy changes

2.1 Structure of the national research system and its governance

Bulgaria is one of the smallest EU-27 economies. In 2008 it produced a GDP of €34,118.1b which equalled 0.27% of the EU-27 GDP². Its GDP per capita in Purchasing Power Standards was 39.8% of EU-27 average³. Bulgaria is among the four countries of the European Union (EU) with lowest R&D intensity. The country spent 0.48% of GDP on R&D in 2007 - almost 4 times less than the EU-27 average. During the last three years the country has registered a decrease in the total intramural R&D expenditure (GERD); from 0.5% of GDP in 2004 to 0.48% of GDP in 2007⁴. However, this relative decrease was counterbalanced by a high rate of real annual GDP growth (see Table 1). Hence, GERD registered an increase in absolute terms: from €99.319m in 2004 to €139.609m in 2007⁵.

Table 1: Macroeconomic indicators, Bulgaria

Year	2001	2002	2003	2004	2005	2006	2007	2008
GDP, million EUR	15249.6	16623.0	17766.8	19875.4	21882.3	25138.2	28898.6	34118.1
GDP, annual growth rate, %	4.1	4.5	5.0	6.6	6.2	6.3	6.2	6.0
GDP, Index, 2000=100	104.07	108.75	114.19	121.78	129.38	137.56	146.05	154.83

Source: Eurostat, 2009.

In 2007 total GBAORD in Bulgaria amounted to €79,577m and came near the average European level of €87,639m. At almost 37% the growth rate of R&D public funding in Bulgaria during the period 2000-2007 was the highest among all European countries. However, expressed as a percentage of general government expenditures, Bulgaria (0.73%) lags far behind the EU-27 average (1.55%). The trend for the period 2000-2007 demonstrates decreasing priority of R&D policy in terms of financial provision.

Table 2: Government budget appropriations or outlays on R&D, Bulgaria

	2000	2001	2002	2003	2004	2005	2006	2007
Total GBAORD (euro million)	58,291	50,106	61,047	61,375	66,398	68,411	75,405	79,577
GBAORD as % of general government expenditure	2.11	1.85	0.91	0.86	0.84	0.8	0.82	0.73

Source: Eurostat, 2009.

In 2008 the Bulgarian government continued to increase public R&D spending in line with buoyant GDP growth as evidenced by increases in the budgets of the National

² Source: Eurostat, Table - main aggregates (annual data), date of extraction: Wen, 01 Apr 09.

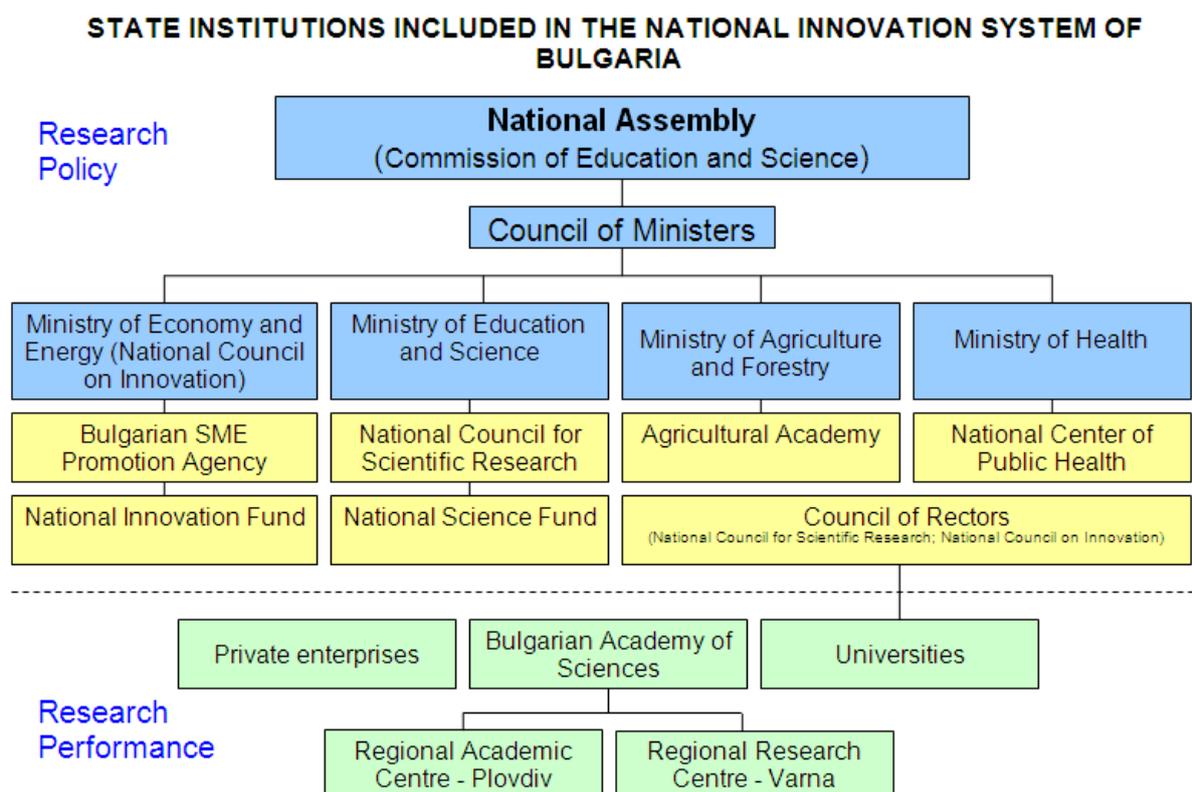
³ Source: Eurostat, Table - general economic background, date of extraction: Wen, 01 Apr 09.

⁴ Source: Eurostat, Table - total intramural R&D expenditure (GERD) by sectors of performance, unit – pc_gdp, date of extraction: Wen, 01 Apr 09.

⁵ Source: Eurostat, Table - total intramural R&D expenditure (GERD) by sectors of performance, unit – mio_eur, date of extraction: Wen, 01 Apr 09.

Innovation Fund and the National Science Fund. The onset of the global financial and economic crisis, however, might arrest this positive trend as Bulgaria entered into economic recession in the last quarter of 2008 for the first time since 1998. In its Spring 2009 Economic Forecast the European Commission expects that Bulgaria's economy will shrink by 1.9% in real terms y-o-y in 2009 with considerable downside risks for public finances. According to a Bulgarian Ministry of Finance data tax revenues for the period January - April 2009 have fallen by 5% y-o-y compared to the same period in 2008, which indicates a shortfall of more than 25 p.p. compared to the 2009 consolidated budget programme. Although the Bulgarian government has vowed to preserve planned R&D spending notwithstanding the crisis continued economic distress might force it to cut or freeze some of its projects. For example, although the Bulgarian government announced its plans to go ahead with its landmark R&D projects and build the first nanotechnology centre in Central and Eastern Europe worth €50m, Bulgarian SMEs have complained publicly that they have not yet received their co-financing pledges from the National Innovation Fund for projects approved in 2008. Thus if the current economic environment does not change dramatically in the second half of 2009 it can be expected that public and private R&D spending in Bulgaria will decline in line with falling GDP.

Figure 1: State institutions included in the national innovation system of Bulgaria



Source: [ERAWATCH Research Inventory](#)

The governance of the Bulgarian research activities is implemented at the national level. The highest policy-making body in research in Bulgaria is the Commission of Education and Science at the Bulgarian Parliament – the National Assembly. The Council of Ministers endorses the most important strategic documents in Bulgaria's research policy. However, the political responsibility for designing and implementing the national R&D policy is with two ministries: the Ministry of Education and Science

(MES) and the Ministry of Economy and Energy (MEE). Other ministries, which oversee sectoral government research organisations, also participate in research policy setting and implementation in their respective domains – Ministry of Agriculture and Food⁶ and the Ministry of Health.

The main public instrument for funding research of both public and private research performers is the National Science Fund (NSF), which is overseen by the National Council for Scientific Research at MES. The responsibilities of NSF encompass: implementation of the national research policy, as well as of the European research policy in Bulgaria; provision of international expertise during the evaluation of project proposals, based on which the subsequent funding is allocated; working out specific schemes to support the national research potential (such as support to young researchers, research infrastructure, and preparation of research projects).

The main government instrument for direct financial support for business R&D is the National Innovation Fund (NIF). NIF supports projects, which include applied research and/or experimentation, encourages the joint project implementation by industry and research organisations (research institutes and universities). NIF is administered by the Bulgarian Small and Medium Enterprises Promotion Agency at the Ministry of Economy and Energy.

The Council of Rectors participates in the formulation of the state policy on higher education and scientific research in Bulgarian universities. It protects the higher education institutions' interests and represents them at national and international level. It facilitates the organisation and implementation of joint initiatives with other university and non-university organisations, working to the advantage of academics and students. It also participates in national and international events on issues related to the higher education and scientific research.

The government sector is the main research performer in Bulgaria. In 2006 the Government sector performed R&D worth 0.31% of GDP (or 65% of GERD). The Business enterprise sector accounted for 0.12% of GDP (25% of GERD), while the Higher Education Sector – for 0.05% of GDP (10% of GERD). The share of the Private Non-Profit Sector was statistically insignificant⁷. The main research performers in the country are: the Bulgarian Academy of Sciences, an autonomous budget funded public research organisation with 74 research institutes, laboratories, centres, and specialised units; the Agricultural Academy, a government research organisation part of the Ministry of Agriculture and Food, which encompasses 21 research institutes, 13 regional service centres for applied science, as well as 1 national agrobiological park, a Centre for Scientific and Engineering Information and the National Agricultural Museum; higher education institutions - 51 universities, higher education schools and colleges. There are no major private research performers.

The regional dimension of R&D policy is not yet developed. There are no mechanisms at the national level to support the implementation of the Regional Innovation Strategies of the six Bulgarian planning regions. These strategies

⁶ The name of the ministry was changed from Ministry of Agriculture and Forestry to Ministry of Agriculture and Food in 2008.

⁷ Source: Eurostat, Table - total intramural R&D expenditure (GERD) by sectors of performance, unit – pc_gdp, date of extraction: Sun, 13 Apr 08.

encompass measures for intensifying the R&D activities of the companies as well as measures targeting research collaboration between business and science⁸.

2.2 Summary of strengths and weaknesses of the research system

In the beginning of the third year of its EU-membership Bulgaria demonstrates a fast growth within areas as human resources, finance and support and economic effects of innovation activity.⁹ However, starting from a very low base, this is not enough for ensuring a catching up EU average levels. As a result Bulgaria remains far behind all other European countries in terms of the performance of its research and innovation system. The prioritising of scientific and technological fields and the financing of public and private R&D continue to present one of most serious challenges for the Bulgarian government.

Table 3: Summary assessment of strengths and weaknesses of the national research system

Domain	Challenge	Assessment of strengths and weaknesses
Resource mobilisation	Justifying resource provision for research activities	<ul style="list-style-type: none"> • The Law on Scientific Research Promotion provides a solid basis for resource provision for research in Bulgaria. However, the Bulgarian Parliament has failed to endorse two consecutive strategies on R&D development, which cripples the legal base for resource provision. • Accountability of public funds spent on research is very low, which in turn might hamper achieving the desired level of coordination and efficiency of total R&D funding.
	Securing long term investment in research	<ul style="list-style-type: none"> • Increase of the funding of research projects of the universities, supported by the Ministry of Education and Science, together with the expanding of the time horizon of their implementation from one to three years.
	Dealing with barriers to private R&D investment	<ul style="list-style-type: none"> • Business R&D expenditures are at the lowest levels in the EU. The deepening financial and economic crisis may lead to more difficulties as a result of the growing intercompany debt and the restricted crediting activity of the banks. • The budgets of the National Innovation Fund and the National Science Fund are growing, including the level of funding per project, which gives the opportunity of increasing the scale of the implemented projects.
	Providing qualified human resources	<ul style="list-style-type: none"> • Deteriorating quality of the educational services both with time (compared to preceding periods) and with each subsequent educational degree. The drop-out rate for school students is more than 20%. • Declining qualifications - Bulgaria ranks last on the indicators for lifelong learning. • Discrepancies between the supply and demand on the labor market as regards qualification levels, professional experience, knowledge and skills among secondary and higher education graduates. • Insufficient number of those employed in R&D and inadequate structure of sectoral employment.

⁸ These strategies were developed in 2004 for the South Central region (funded by FP5) and in the beginning of 2008 for the other 5 regions (funded by FP6).

⁹ European Innovation Scoreboard 2008, Comparative analysis of innovation performance, INNO METRICS, January 2009.

Domain	Challenge	Assessment of strengths and weaknesses
Knowledge demand	Identifying the drivers of knowledge demand	<ul style="list-style-type: none"> The share of innovative enterprises as users of new technological knowledge is increasing, mainly due to expanding the market share and standardisation requirements. One of leading drivers of economic growth remains the high-technology sectors, including ICT.
	Co-ordination and channelling knowledge demands	<ul style="list-style-type: none"> The good coordination between the technical universities and the businesses from the corresponding region is preserved. Most of these collaborations are informal, thanks to personal contacts in already existing traditional social networks. A new mechanism is the establishment of innovation incubators that have been set up around some of the universities.
	Monitoring of demand fulfilment	<ul style="list-style-type: none"> There is an increasing abundance of monitoring instruments in the public and the private sector, as well as at EU level, though with varying quality.
Knowledge production	Ensuring quality and excellence of knowledge production	<ul style="list-style-type: none"> External evaluation of the activities of BAS is currently running, which is to be completed by the end of 2009. Based on the outcomes proposals will be made on the future development of viable units of BAS as well as on the development priorities.
	Ensuring exploitability of knowledge	<ul style="list-style-type: none"> Increasing number of patents are being discontinued by Bulgarian enterprises, due to financial difficulties and lack of economic interest for developing production activity on the basis of the patents Prevalence of patent applications from individuals, which is a barrier to the provision of institutional support in commercialising the results from research activities. Low application and patent activity, including IPR protection before the European Patent Office and the US Patent Office. Low level of commercialisation of R&D results.
Knowledge circulation	Facilitating circulation between university, PRO and business sectors	<ul style="list-style-type: none"> 10 PHARE projects supporting high-tech clusters in their embryonic stage of development ended in 2008. These clusters brought together the efforts of enterprises, universities, research institutes of BAS and research centres.
	Profiting from international knowledge	<ul style="list-style-type: none"> A National Roadmap for Research Infrastructures - developed by MES – as an integral part in the implementation of European projects in the domain of science and technologies. Universities and PROs have increasingly better access to international knowledge through long-term agreements with European counterparts and the Framework programmes.
	Enhancing absorptive capacity of knowledge users	<ul style="list-style-type: none"> Low knowledge absorptive capacity of Bulgarian industry and small number of innovative enterprises coupled with lack of qualified personnel.

In order to ensure international comparison of the assessments the present analysis is focused on key processes relevant for the national research system performance. Four policy-relevant domains of the research system have been distinguished, namely resource mobilisation, knowledge demand, knowledge production and knowledge circulation. This report is based on a synthesis of information from the ERAWATCH Research Inventory and other important available information sources.

2.3 Analysis of recent policy changes since 2008

The priorities of the Bulgarian government for developing science and technologies, and creating competitive advantages thereof, have been discussed in several documents: the draft National Research Strategy 2008 – 2018 (proposed in 2008), the National Reform Programme 2008 – 2010 and the Action Plan for its implementation, as well as in the Better Regulation Programme 2008 – 2010.

The draft National Research Strategy of 2008 has a time horizon of 10 years and provides the framework for the development of the research institutions as well as the research and innovation activities in Bulgaria. The Strategy has been adopted by the Council of Ministers but has not yet passed through parliamentary approval as required by the Law on Scientific Research Promotion.

The intended impact of the strategy's implementation is related to the increase of public and private investment in research, identification of priority areas for research and innovation, as well as development of the research potential of Bulgaria. As per the strategy the research expenditures are planned to reach 1% of GDP by 2013.

The analysis of the implementation of the National Reform Programme 2006-2008 reports on new measures focused on research, technology development and innovation (RTDI) and education, which have commenced in the second quarter of 2008. These measures target the modernisation and integration of the Bulgarian Research and Education Network and the Computer Network of the Bulgarian schools. The provisional accomplishment of these measures is foreseen by the end of 2011.

A Better Regulation Programme was approved in 2008 following the recommendations in the European Commission Strategic Report. This programme introduces the governmental measures in the period 2008 – 2010.

Changes in National Reform Programme regarding the role of research in the broader economic growth strategy

The National Reform Programme 2008-2010 includes measures, which address the recommendations made in the Strategic Report of the European Commission and create the opportunities for achieving the goals for economic and social cohesion based on R&D. The deadline for some of the measures has been extended as follows:

- The Programme “Qualification services and training for employed persons” (due to the launch of new schemes under the programme);
- Research and development financing of manufacturing companies under grant schemes of the National Innovation Fund;
- Training (on a regional basis) of businessmen and granting free financial support for starting up a business – micro and small enterprises (to be completed in the fourth quarter of 2011 instead of in the same quarter of 2009).

2.3.1 Resource mobilisation

The National Reform Programme encompasses measures for increasing the financial support for research and innovation activities and improving the quality of human resources in research and technology development. The most important are:

- 1) Creating conditions for the successful operation of venture capital (VC) funds for scientific, technological and innovative products and services: in the national budget for 2009 the amount of €0.3m is foreseen for implementing this measure.
- 2) Launching a grant scheme for upgrading the research equipment (for conducting applied research) of Bulgarian research organisations. The Monitoring Committee of Operational Programme (OP) Competitiveness took a decision (on 18 Dec 2007) for the scheme to be jointly implemented by the Managing Authority of OP Competitiveness and the National Science Fund. The measure is currently under development and will encompass two complementary components: supply of research equipment (OP Competitiveness) and implementation of research and demonstration projects using the supplied equipment (National Science Fund). The objective of the measure is to improve the conditions for conducting applied research and the provision of innovative services to enterprises. The indicative budget is €20m comprising of €3m from the national budget and €17m from the European Regional Development Fund.
- 3) Adopting a new Law on Higher Education, provisionally foreseen for 2009-2010. The new law will introduce the university rating system, taking account of the universities' contribution to the national research performance. This is meant to improve the model of funding and management of universities and thus to overcome the fragmentation, as well as to ensure the autonomy and the accreditation of the universities.

Table 4: Main policy changes in the resource mobilisation domain

Challenges	Main Policy Changes
Justifying resource provision for research activities	<ul style="list-style-type: none"> • The Law on the National Budget for 2009 provides for an increase of the resources of the National Science Fund to €51.1m (BGN100m). The Fund will support mainly research projects. The budget for 2009 plus some additional mechanisms create stimuli for institutes and researchers from BAS, the Agricultural Academy and the universities to implement research projects in a limited number of priority areas for the national economy. • OP Competitiveness has already started operations, including Priority 1 “Development of Knowledge-Based Economy and Innovation Activities”, which will support projects with research and development activities and innovation. • Accounting for the fragmentation of the research activities in the country and in order to reach concentration of resources the budget for 2009 foresees the amount of BGN 0.5m for conceptualising and developing a new model of HEI and the research organisations, which are publicly funded.
Securing long term investments in research	<ul style="list-style-type: none"> • In 2008 a proposal to merge the National Innovation Fund and the National Science Fund was presented. However, this decision was made in a non-transparent way without sufficient public debate, which incited institutional opposition and resistance rather than achieves unity and coordination of the various points of view. Along with this, there is a real threat that the merger will cause delays in the evaluation and funding procedures of the forthcoming sessions of the two Funds.

Challenges	Main Policy Changes
Dealing with uncertain returns and other barriers	<ul style="list-style-type: none"> • The National Reform Programme for 2008-2010 indicates a number of other objectives that aim to reduce barriers to R&D investments within Bulgaria. Among these are refocusing R&D to specific priorities, protecting competition and increasing information and communication technologies within Bulgaria. • Absence of special legislation regulating the creation of Bulgarian equity investment funds. It is needed to regulate matters of principle concerning the raising of capital in specialised pools (Funds) with clear criteria for its investment and return after a certain period of time (10-12 years). • New instruments for financing research – voucher schemes, competitions for techno-starters – technology companies of students.
Providing qualified human resources	<ul style="list-style-type: none"> • During the 2008/2009 academic year the number of vacancies for PhD students in universities and research organisations has increased by 46% compared to the 2007/2008 academic year and reached 1,403 (1,049 full-time students and 354 extramural students). • One of the main foci during 2008 was put on strengthening of all mobility centres – the Research Mobility Centre at the Bridgehead organisation (BRMC) and the regional Research Mobility Centres (RMC) in Sofia, Stara Zagora, Rousse and Varna. The Sofia RMC started its functions as an Intersectoral Mobility Centre and carried out an industry-academia seminar. • MES adopted Regulation № 1 on the rules and procedures for inclusion of national research organisations in the national list of organisations having the right to employ third-country residents on research positions. • Bulgaria does not mirror the positive trend of change of the share of people employed in science and technology within general employment which is characteristic of the average European style. • Reintegration grant schemes have been launched for attracting Bulgarian scientists, living and working abroad. • A strategy for the development of higher education is currently widely debated.

2.3.2 Knowledge demand

The identification of strategic priorities for the development of the Bulgarian economy will stimulate the demand for new technological knowledge and innovation. This process is framed by the present and new initiatives (see the table below) and is financed through the National Innovation Fund, the National Science Fund and the Operational Programmes. The analyses for assessing the demand fulfilment are carried out by different institutions (ministries and public agencies, NGOs etc.) and focus the attention on various aspects of the needs and perceptions of both end and industrial users. The main findings suggest that these users cannot be characterised as innovative ones (mainly because of their low solvency), and in this sense cannot pull the creation of radical technological innovation, based on new knowledge. Indications for these facts can be found in Eurobarometer, as well as in the national analytical reports Innovation.BG, published annually.

Table 5: Main policy changes in the knowledge demand domain

Challenges	Main Policy Changes
Identifying the drivers of knowledge demand	<ul style="list-style-type: none"> The national strategic and legal frameworks for the development of ICT and renewable energy sources (RES) have been harmonised with the EU. ICT and RES provide a technological platform for the development of the national economy.
Co-ordinating and channelling knowledge demands	<ul style="list-style-type: none"> According to Measure 10 of the National Innovation Strategy, centres for the promotion of the entrepreneurship activity of university students have been set up in 4 universities. The amount foreseen for this is €0.225m, the period is 2 years. The following universities have signed contracts: the University of Forestry in Sofia, the Technical University – Sofia, the branch in Plovdiv, the Technical University in Gabrovo and the Technical University in Varna.
Monitoring demand fulfilment	<ul style="list-style-type: none"> The main monitoring instruments used for the research purposes of the government and regional authorities, the National Statistical Institute and NGOs are at the lower end of sophistication, such as sociological inquiries, focus groups, expert techniques, etc.

2.3.3 Knowledge production

The development of the Bulgarian research infrastructure has stabilised after the structural changes during the last 20 years. The new challenges for research institutions are related to intensifying and diversifying the forms and channels of transferring knowledge to practice. 2009 is a year of rethinking and evaluating the place of BAS within the national research and innovation system. Such evaluation has already been accomplished for the Agricultural Academy where both basic and applied research is conducted entirely according to the needs of knowledge users.

Table 6: Main policy changes in the knowledge production domain

Challenges	Main Policy Changes
Improving quality and excellence of knowledge production	<ul style="list-style-type: none"> A national list of scientific research organisations is under development in accordance with the MES Regulation №1 from 12 February 2008. Currently a project for external evaluation of research organisations is in implementation. The amount foreseen in the national budget 2009 for this evaluation is €0.3m. The intended impact is to identify opportunities for participation of high-level research activities based on the outcomes of the evaluation.
Ensuring exploitability of knowledge production	<ul style="list-style-type: none"> A campaign for introducing IPv6¹⁰ in the country commenced in the third quarter of 2008. The objective is to support the development of applied research expertise, which is deemed necessary for improving the information society services and the introduction of IT applications by the businesses. In September 2008 a Supercomputer Centre for Scientific Research was launched by the State Agency for Information Technology and Communications (SAITC). €2.5m were invested in this centre. Organisations, such as Bulgarian Academy of Science, Ministry of Finance and universities will be able to access the computing power of the supercomputing centre to carry out complex scientific research.

¹⁰ Internet Protocol version 6 (IPv6), the next-generation Internet Layer protocol for packet-switched internetworks and the Internet.

During 2008 and 2009 the Government has undertaken some initiatives to stimulate research activities in some important economic sectors like renewable energy sources, information and communication technologies (ICT), nanotechnologies. Some of them are presented in the table above.

2.3.4 Knowledge circulation

Narrowing the relationships between knowledge creation and knowledge demand pools within the national research and innovation system is recognised by the government as a factor of utmost importance for the efficient functioning of the economy, especially in the conditions of open innovation processes. The table below presents the most recent initiatives of the Bulgarian Government towards faster and easier knowledge circulation. Part of these initiatives are foreseen in the Innovation Strategy and Plans for its implementation. Others have been launched because of the negative influence of the financial and economic crises on the Bulgarian business. Important instruments for improving the absorption capacity of firms as knowledge users are the newly signed contracts between the Bulgarian Government and the European Investment Bank, namely JEREMIE and JESICA, which are expected to stimulate the innovation activity of the firms and regional authorities.

Table 7: Main policy changes in the knowledge circulation domain

Challenges	Main Policy Changes
Facilitating knowledge circulation between university, PRO and business sectors	<ul style="list-style-type: none"> • Aiming to encourage the knowledge transfer to enterprises the Ministry of Energy and Economy launched a voucher scheme. The funding will be provided by the national budget. The measure is meant to stimulate market-oriented applied research and transfer of knowledge to enterprises. • The establishment of Networks of research institutions with the participation of national and regional research units is currently ongoing. The process is centrally administered by the Ministry of Education and Science; so far 13 networks have been registered involving more than 100 organisations.
Profiting from access to international knowledge	<ul style="list-style-type: none"> • MES provided free access to full-text databases with scientific publications - ScienceDirect and ProQuest as well as national licenses for access to scientific information in the digital libraries of Scopus, ISIknowledge, EMBASE and Engineering Village platforms to BAS and all universities in the country.
Absorptive capacity of knowledge users	<ul style="list-style-type: none"> • The Ministry of Economy and Energy (MEE) and the United Nations Development Program (UNDP) announced a national programme for promoting the innovative activity of young people in Bulgaria known as the TECHNOSTART Project. Under this program, undergraduate students or those who graduated in 2008 aged up to 29 and having no registered firms in their name can apply for grants. On the basis of approved business plans, the young people receive grants of app. €0.01m (BGN0.02m) with mandatory co-financing on the part of the entrepreneurs-to-be amounting to 10%. • The Bulgarian Development Bank was established following the adoption of a special law by the National Assembly in April 2008. The Bulgarian Development Bank group includes the Bulgarian Development Bank (BDB), the National Guarantee Fund (NGF) and the Capital Investment Fund (CIF). Their activities are directed towards all micro, small and medium-sized enterprises registered in the Republic of Bulgaria.

2.4 Policy opportunities and risks related to knowledge demand and knowledge production: an assessment

Following the analysis in the previous section, this section assesses whether the recent policy changes respond to identified system weaknesses and take into account identified strengths. Policy opportunities related to knowledge demand and knowledge circulation in Bulgaria are mainly related or driven by EU initiatives and financing, most notably though the OP Competitiveness and OP Development of Human Resources. However, the lack of national research priorities and the high degree of institutional fragmentation of public research organisations coupled with the low-tech profile of the Bulgarian economy create the risk of locking Bulgaria in a low-demand – low-supply trajectory of knowledge creation and use.

Table 8: Summary of main policy related opportunities and risks

Domain	Main policy related opportunities	Main policy-related risks
Resource mobilisation	<ul style="list-style-type: none"> • Adoption by the Bulgarian Parliament of the Draft National Research Strategy 2008-2018, which is to consolidate the activity and interaction of the main actors of the national research system. • Growing share of women engaged with research, which is to be considered as a potential for increasing the number of human resources in science. 	<ul style="list-style-type: none"> • Lack of adequate financial resources for securing modern research infrastructure development, the negative effects of which are magnified in the situation of financial and economic crisis. • Lack of consensus on the national research priorities: different policy documents introduce conflicting priorities, which are not subject to wider public debate. • Deepening of the financial and economic crisis and the related limitations of the budgets of businesses for research and innovation activities and R&D personnel training.
Knowledge demand	<ul style="list-style-type: none"> • Increasing financial resources for the creation of new high-tech companies, promotion of entrepreneurship and technological innovation under OP Competitiveness and the National Innovation Fund, stimulate the demand for research products and the collaboration of research and business. 	<ul style="list-style-type: none"> • Despite changes to the Law on Investment Promotion introduced in 2008, Bulgaria is about to lose some of its competitive advantages, based on which the country, successfully attracted the first wave of investors – high-quality labour force complemented by low personnel costs. • The Bulgarian economy continues to have a low technology profile both in terms of production and in terms of export, which in turn cannot pull the creation of new knowledge.
Knowledge production	<ul style="list-style-type: none"> • An external evaluation of BAS is ongoing, which together with the proposed Draft National Research Strategy 2008 – 2018 will provide the opportunity for identifying and coordinating priority areas for the development of the Bulgarian science. 	<ul style="list-style-type: none"> • High degree of institutional fragmentation, the result of which is inefficient distribution of funds and inefficient research expenditures.
Knowledge circulation	<ul style="list-style-type: none"> • Better visibility of the scientific journals published in Bulgaria, as a result of the inclusion of 6 new Bulgarian journals (upon meeting the selection criteria) in Thompson Reuters databases. 	<ul style="list-style-type: none"> • The strong regional divergence in regard to the development and use of research results as well as the research potential continues to cripple Bulgaria's R&D performance.

3 National policy mixes towards R&D investment goals

The aim of this chapter is to deepen the analysis of national policy mixes with a focus on public and in particular **private R&D investment**. The Lisbon strategy emphasises an EU overall **resource mobilisation objective** for 2010 of 3% of GDP, of which two thirds should come from private investment. R&D investment is seen as important yardstick for the capacity of an economy to turn the results of science and research into the commercially viable production of goods and services and hence knowledge into growth. Corresponding investment policies are mainly pursued at national level and determined with a national focus.

The chapter is structured around five questions:

1. What are the specific barriers in the country that prevent reaching the Lisbon goal? What barriers exist in the country to prevent reaching the specific targets, particularly related to the private sector R&D investments?
2. Given the above, what are the policy objectives and goals of the government that aim to tackle these barriers?
3. What Policy Mix routes are chosen to address the barriers and which specific instruments and programmes are in operation to implement these policies?
4. What have been the achievements in reaching the above mentioned R&D investment objectives and goals?
5. What are the reasons for not reaching the objectives, adaptation of the goals?

The chapter aims to capture the main dimensions of the national policies with an emphasis on private R&D investment. The chosen perspective of looking at investments in R&D is the concept of Policy Mixes. The analysis and assessment follows a stepwise approach following the five questions mentioned above.

3.1 Barriers in the research system for the achievement of R&D investment objectives

One of the prerequisites for the good performance of the national R&D system is the level of investments in R&D. Since Bulgaria joined the EU a lot of good practices were adopted in the R&D domain, as well as a number of modern instruments and schemes were implemented. Though most of these have been funded by increases in the national budget, the overall level of public funding remains insufficient, as these increases have not outpaced strong real GDP growth. In turn this exerts strong influence on the value of various indicators measuring national R&D performance (CREST, 2008). The prevailing public funding of research activities is indicative of problems in both the efficiency and utility of research in stimulating economic growth, as well as an unhealthy relationship between publicly funded research on the one hand, and the technological absorptive capacity of private sector firms on the other.

The continuing fragmentation of the national public R&D system is another persistent problem, which causes sporadic distribution of funding and lack of a clear focus on targeted research areas. It also prevents sound concentration on scientific excellence. R&D policy documents outline quite a few thematic focus areas for the national research policy. The Draft National Strategy for Scientific Research for the Period 2005-2013 indicates that: national identity, information technology, new

materials and technologies, and agro and biomedical research are the key priority research areas. The National Reform Programme 2007-2009 on the other hand includes other areas such as: ICT, genetics, medicine, biotechnology, machine building, energy-saving technologies and nanotechnologies. Recently, there has been a strong emphasis on improving the retention and mobility of young scientists within Bulgaria as well as an increase in university infrastructure funding to prevent a further loss of human capital ([Damianova Z., Stefanov R., 2009](#)).

Weak collaboration between publicly funded institutions and the lack of a coherent national research strategy persist. Thus any increase in direct governmental aid for R&D brings only diminishing returns as it spreads thinly across many public research units and research themes with little or no synergy. This calls for a reform in the major public recipients of governmental aid as noted by the Commission in its annual assessment of Bulgaria's National Reform Programme. This could come in the form of either institutional restructuring or increased collaboration among public and private sector stakeholders, including collaboration between the two ministries responsible for research and innovation: the MES and the MEE. The impact of the two main national competitive funding instruments, the NSF and NIF is also harmed by the lack of national support for intermediary organisations. The only measure to support these organisations is foreseen in OP Competitiveness but no calls have yet been launched. Thus public funding does not address the public-private funding split but rather reinforces it. This is indicative of a more systemic problem resulting from the lack of foresight and planning for overall national objectives. Given Bulgaria's limited resources it is essential that it finds R&D niches revolving around areas where its human potential is highest. As of yet it has become clear that the objectives in policy documents are at odds with the availability of both funding and funding instruments.

Another major barrier to achieving Lisbon R&D investment objective that has emerged since 2000 in Bulgaria is the quality and availability of human resources for R&D. Bulgaria has ascertained itself as a place of well-educated, low-cost labour, which has attracted increasing numbers of multinational corporations to the country. Although this has brought in new technological knowledge and has increased Bulgaria's competitiveness, it has not resulted in increased R&D investment in the private sector, as multinationals have sought to exploit only low-cost advantages, facing labour shortages and deteriorating labour force quality (Innovation.BG, 2007). This is indicative of the need to (1) increase the quality of educational institutions within Bulgaria through incentives for world-class university researchers' inward mobility and (2) support intermediary organisations between public and private innovative and R&D centres ([ERAWATCH Research Inventory 2009](#)).

Downward trends in employment in technical fields is exacerbating Bulgaria's precarious R&D situation. Employers cite the lack of qualified labour force as a reason for modest or non-existent innovation expenditures within their companies (Innovation.BG 2008). An increasing number of young Bulgarians opt to pursue higher education outside Bulgaria where educational establishments have better access to financial and technical resources. This 'brain-drain' is severely damaging to the current and future potential of Bulgarian R&D. National policy documents and analyses (MEE, 2007 and MEE, 2008, as well as Innovation.BG, 2008 and Innovation.BG, 2009) have indicated the need for: (1) increasing the remuneration of qualified teachers and researchers, (2) updating educational infrastructure, and (3) attracting young people to study and work in Bulgaria. The impact of active

programmes, addressing these issues, like OP Competitiveness, OP Human Resources and the programmes of NSF, remains limited.

Another significant problem in increasing innovative and scientific outputs is the small amount of venture capital (risk capital) for new Bulgarian start-up firms. This is a result of both the lack of such firms requesting capital (as they tend not to perform research) as well as venture capitalists seeing relative risk-benefit ratios as unattractive.

Finally, the 'knowledge triangle' among business, universities and public research institutes is weak. Since few Bulgarian enterprises have any 'in-house' innovative departments, most of their technical needs come from utilising the research of outside firms. Employers see cooperation with universities and research institutes as cost prohibitive and claim that they do not have access to qualified people who they could employ to take advantage of innovative breakthroughs which are necessary to effectively utilise and absorb knowledge (MEE, 2008). Steps by the two national funds have begun to address this issue but remedies are still in their infancy.

3.2 Policy objectives addressing R&D investment and barriers

The most recent and comprehensive document addressing R&D investment and barriers and stating policy objectives for overcoming them is the Draft National Research Strategy 2008 – 2018 adopted by the Council of Ministers in 2008. It stipulates that R&D spending (GERD) in Bulgaria should reach 1.8% by 2018. This is a very ambitious target given trends since 2000, and it would require a radical acceleration in policy measures to address R&D investment and barriers. Between 2000 and 2007 R&D expenditures remained flat, failing to take advantage of European accession or of increasing economic competitiveness ([ERAWATCH Country Profile, 2008](#)). Bulgaria has already failed to achieve an earlier goal for R&D expenditure set in the National Innovation Strategy of 2004. It set the goal of achieving GERD as a percentage of GDP of 1.15% by 2013 by assuming an annual increase in R&D spending share in GDP of 0.1% each year. So far Bulgaria has missed on this growth goal. The National Innovation Strategy, has also set a goal for R&D business expenditure to reach 0.32% of GDP by 2013, which also does not seem likely given the small rates of increase from 2005-2007 ([INNO-Policy TrendChart, 2007](#)).

3.3 Characteristics of the policy mix to foster R&D investment

This section is about the characterisation and governance of the national policy and instrument mix chosen to foster public and private R&D investment. While policy goals are often stated at a general level, the policy mix has a focus on how these policy goals are implemented in practice. The question is what tools and instruments have been set up and are in operation to achieve the policy goals? The following sections will each try to tackle a number of these dimensions.

3.3.1 Overall funding mechanisms

R&D in Bulgaria continues to be predominantly funded and performed by the public sector. In 2008, approximately two thirds of the R&D funding was secured by the public sector: €127.9m came from the national budget and another €12m - from the European Structural and Cohesion Funds. The remaining third of R&D funding comes predominantly from the business sector and to a very small degree from non-

profit and higher education sources. Thus Bulgaria's R&D funding structure is the exact opposite to the EU-27 average and to Lisbon R&D funding policy objectives. Despite annual increases in GERD, its share of GDP remains stable ([ERAWATCH Research Inventory, 2009](#)). One of the most often cited reasons for the misbalance between public and private R&D funding in Bulgaria has been the predominance of direct, institutional R&D subsidies in the public sector, which have failed to seek co-participation from the private sector. In recent years there has been a shift away from general to more thematic focus of public R&D funding, although it has yet to produce results in terms of increased participation of the private sector in R&D and better efficiency in the public R&D sector. It is expected that in 2009 competition-based public R&D funding will outstrip direct public R&D subsidies in a ratio of 60:40.

One of the funding mechanisms directed at leveraging public through private R&D funds is the introduction of thematic project-based competitive public financing at the expense of direct institutional subsidies. In the past two to three years the percentage of funds directed to thematic and project-based research has increased, as indicated by the annual budgets of NSF and NIF. Rises in the budgets of these two financial instruments have outstripped other forms of public R&D funding in Bulgaria. Between 2005 and 2009, the budget for the NSF rose from €6.4m to €51.3m and that of the NIF - from €2.5m to €10m (Innovation.BG, 2009). The profile of funded projects has changed from basis science to applied output-directed science. The two funds provide significant co-funding to SMEs (up to 75%) to lure them into R&D and innovation.

Two operational programmes complement the competition-based public funding of the NSF and NIF: OP Competitiveness (focused on upgrading the research infrastructure) and OP Development of Human Resources (focused on strengthening the R&D human potential). While OP Development of Human Resources launched two calls for proposals in 2008 for strengthening the national research potential, the start of OP Competitiveness has been delayed until 2009.

3.3.2 Policy Mix Routes

The "Policy Mix Project" identified the following six 'routes' to stimulate R&D investment:

1. promoting the establishment of new indigenous R&D performing firms;
2. stimulating greater R&D investment in R&D performing firms;
3. stimulating firms that do not perform R&D yet;
4. attracting R&D-performing firms from abroad;
5. increasing extramural R&D carried out in cooperation with the public sector or other firms;
6. increasing R&D in the public sector.

The routes cover the major ways of increasing public and private R&D expenditures in a country. Each route is associated with a different target group, though there are overlaps across routes. The routes are not mutually exclusive as, for example, competitiveness poles of cluster strategies aim to act on several routes at a time. Within one 'route', the policy portfolio varies from country to country and region to region depending to policy traditions, specific needs of the system etc.

Route 1: Promoting the establishment of new indigenous R&D performing firms

This route for stimulating R&D investment in Bulgaria has not been used actively. Until the start of support under the EU's Structural Funds in 2007 efforts in this direction have been sporadic, e.g. one-off annual awards for start-ups or rather small scale. Currently support for setting up new RTDI companies is provided under OP Competitiveness: so far 11 projects two-year projects have been contracted for the set up and development of new companies in 2008. The average support provided per company was €0.345m.

Bulgaria has the lowest levels of corporate research among the EU member states. According to the Fifth Community Innovation Survey in 2004 – 2006 innovative firms accounted for only 20% of all companies in Bulgaria, which is twice lower than the EU average (39%). The Survey of Innovation Activity of the Enterprises in Bulgaria conducted annually by the Applied Research and Communications Fund (for the production of Innovation.BG analytical reports) showed that in 2008 the share of innovative firms has increased to 29%. The low R&D intensity of companies holds true not only for the domestic but also for foreign and multinational companies (Innovation.BG, 2007). In general, Bulgarian companies apply knowledge and technologies developed outside the country.

Route 2: Stimulating greater R&D investment in R&D performing firms

and

Route 3: Stimulating firms that do not perform R&D yet

Route 2 and Route 3 are implemented through schemes under NIF and OP Competitiveness.

Support to R&D performing companies is a central objective for NIF. In 2008 NIF rules were updated to allow for increasing the level of public co-funding for SMEs engaged in RTD projects. Thus, in addition to the initial 50% of the funding of the project costs, SMEs engaged with RTD projects get additional 20%, or a total of 70%, of the project costs covered by NIF.

NIF encourages joint participation of companies and research organisations in its calls for proposals. All projects with RTD partners enjoy higher – in terms of percentage of the funding of the project costs - financial support, which can go up to 80% of the total project value. According to the updated NIF rules newly established companies (Route 1) can participate on the condition that at least 15% of the total project costs are spent on R&D activities.

OP Competitiveness also envisages support to existing innovative companies in its working programme for 2009 but no calls have yet been announced.

Route 4: Attracting R&D-performing firms from abroad

Investments from R&D-performing firms from abroad have increased in Bulgaria since 2000 but so far foreign investors, including multinationals have been attracted primarily by low labour costs, and have avoided performing R&D in the country (Innovation.BG 2007).

Although Bulgaria has always had special clauses in its investment promotion and public procurement legislation targeting higher R&D investment these have been dwarfed by other stimuli, which have generally favoured scale over quality. Special

schemes for the attraction of foreign R&D companies have not yet been developed. It is expected that the opening up of R&D promotion schemes under OP Competitiveness and other EU funds' programmes might attract foreign participation.

There are two factors that can open up Route 4. The first is the identification of local competences that might help foreign companies expand their markets locally or abroad where Bulgarian companies have special expertise (e.g. the Balkans or Russia). Such small R&D activities may, if the circumstances are right, lead to further investments in the future. Second the creation of local competence clusters where Bulgaria shows excellence, for instance ICT and mechatronics, as well as optoelectronics.

Route 5: Increasing extramural R&D carried out in cooperation with the public sector

A number of instruments have been developed since 2007 to encourage research cooperation between industry and science (both NSF and NIF launched voucher schemes; NIF increased the percentage of financial support for projects with a R&D component). However, Route 5 remains underutilised as the R&D absorption capacity of the private sector remains low and relevant public R&D policies, such as the development of innovation infrastructure and innovation services, as well as public-private partnerships, have not taken up.

Route 6: Increasing R&D in the public sector

Increasing R&D in the public sector is desirable given the small amount of funds allocated to R&D in Bulgaria as a whole. Also, increasing R&D expenditures in the public sector requires streamlining and prioritisation of objectives within the public research organisations before an increase in funding would be useful. Recent developments can be summarised as follows:

- During the last two years the budget for programme-oriented and project-based activities has been quadrupled. More than 30% of the new funding schemes have been implemented in the public sector.
- Supportive activities: national licenses have been received for several e-knowledge platforms like SCOPUS, WEB of Science, Science direct; membership fees for EU international research organisations have been paid; co-funding schemes to support the Bulgarian participation in projects under 7 FP and COST have been launched.

For both Route 5 and Route 6, a national mechanism to co-fund the Bulgarian participation in FP7 has been launched for the first time, since Bulgaria acceded the EU framework RTD programmes (FP5).

The importance of education and innovation policies

It has been cited by employers that they are often not able to find qualified personnel to meet their specific business or research needs (MEE, 2008). This is a symptom of some underlying issues within the Bulgarian educational system regarding both the quality of education within Bulgaria as well as the ability of both the private and public sectors to retain highly qualified staff. Both the secondary and university levels of education have continuously decreased in quality since Bulgaria's democratic and market-oriented transition ([INNO-Policy TrendChart, 2007](#)).

The development of high-quality human resources was outlined as a high priority area in the National Innovation Strategy. The strategy envisaged the promotion of

employment for young specialists and the establishment of entrepreneurial centres in centres of higher education. However, given the fact that NIF was the only sizable financial instrument for realizing the strategy though the measures for human resources promotion were nominally carried out they did not affect the national R&D performance. In 2006-2007 the MES developed an action plan to increase research levels, which states that a key goal in the achievement of that objective is to “mobilise human resources” ([INNO-Policy TrendChart, 2007](#)). These policies mostly stimulate education and non-R&D activities in the public sector in the hope that the private sector (Route 2 above) can absorb some of this information as well as well-trained researches after their graduations or if they want to join the private sector.

The Cohesion Fund through OP Development of Human Resources is a major instrument for stimulating R&D through education and science related projects, e.g. in 2008 the programme supported a total of 405 projects of young scientists at €11.7m.

Assessment of the importance of policy mix routes and their balance

Table 9: Importance of routes in the national policy and recent changes

Route	Short assessment of the importance of the route in the national policy	Main policy changes since 2008
1	Important (3) for the retention of researchers and an increase in overall innovation levels but problematic given current problems in obtaining financing	One new scheme under OP Competitiveness and update of the NIF rules, allowing newly established R&D companies to participate in the calls for proposals.
2	Extremely important (5) in increasing overall R&D levels especially in areas of private R&D which is low in Bulgaria but essential for economic growth and in allowing Bulgaria to thrive as economic turmoil calms.	2 voucher schemes – 1 under NIF and 1 under NSF were launched Update of the rules for participation in NIF
3	Very important (4) in increasing overall and private levels of R&D and in creating a market for qualified researchers to obtain employment in their fields.	No changes
4	Mildly important (2) as foreign firms do not see Bulgaria as an area for performing novel research and educational and structural reforms must happen prior to significant progress in this area.	No changes
5	Extremely important (5) in order to create a symbiotic relationship between business, public sector and educational institutions and to leverage predominant public financing.	Two voucher schemes – 1 under NIF and 1 under NSF were launched National co-funding mechanism for the participation of Bulgarian organisations in FP7
6	Important (3) but should be increased with an even greater increase to private R&D funding. As a percentage of total GDP this indicator is still far below EU averages and Lisbon objectives	Shift to thematic funding for direct budget subsidisation. 30% of funding to new schemes National co-funding mechanism for the Bulgarian participation in FP7

3.4 Progress towards national R&D investment targets

National R&D targets as laid out in the National Innovation Strategy of 2004 are not being met. According to the strategy's initial projections GERD should have reached 0.85% of GDP in 2007, whereas according to EURSTAT the actual figure was 0.48% instead. In terms of BERD the strategy's projections have proven closer to reality. In 2004 the National Innovation Strategy projected BERD would stand at 0.17% of GDP in 2007 whereas the actual value was 0.15%. Overall R&D expenditures that have stagnated in past few years will need much more than an extension of current policies for significant changes to occur.

The reasons why there has been little or no progress made towards national R&D investment targets although there has been a lot of public pledges in that direction, are numerous but the lack of knowledge and administrative capacity in implementing relevant policies takes central stage. The goals for R&D increases were ambitious but feasible taking into account robust GDP growth in the period 2000-2008 if only adherence to the objectives was met with increased emphasis at the highest levels of government. There was work done at the policy formulation level but no progress was registered at the implementation and monitoring stages. Barriers to R&D investment were only partially addressed by NIF and NSF but the two instruments cannot meet the full spectre of R&D investment needs.

Table 10: Main barriers to R&D investments and respective policy opportunities and risks

Barriers to R&D investments	Opportunities and Risks generated by the policy mix
Insufficient number of adequate funding instruments and weak coherence between NIF and NSF	O: Diversification of the instruments of NSF and NIF to support public and private R&D projects; co-funding of projects supported by FP7 and CIP; joint priorities of NIF and NSF to ensure continuity in support. R: As of result of weak collaboration between publicly funded institutions, and lack of a coherent national research strategy with clear R&D priorities, increases in direct governmental aid does not result in higher R&D outputs.
Lack of human resources	O: Increase in educational and OP financing to develop human resources; good number of support measures for researchers launched in 2008 and the first quarter of 2009, their efficiency is still to be seen. R: The number of schemes aimed at supporting R&D personnel in the universities and the research institutes is much higher than that aimed at companies, which might further deepen the misbalance between the public and the private sector.
Lack of links between industry, educational institutions, and public research centres	O: NSF and NIF support the linkages between these stakeholders and the creation of research centres of excellence and clusters to facilitate the exchange of information. Their impact will be strengthened should according to the proposed draft R&D strategy for the period 2008 – 2018 the two funds merge in a single national fund for research and innovation. R: The merger of the two national R&D funds, proposed in 2008, might delay the release of new calls until administrative and political issues be resolved. This might result in redirecting beneficiary companies towards OP Competitiveness, leading to unwanted substitution of national for EU R&D funding.

Barriers to R&D investments	Opportunities and Risks generated by the policy mix
Lack of venture capital	O: The launch of OP Competitiveness as well as existing opportunities under the JEREMIE programme have shaped expectations that VC funds will be created, which might help lure private investors. Soft measures could be implemented through OP Competitiveness to build the capacity of the potential applicants. R: Lack of critical mass of VC fundable private sectors projects due to high risk-aversion among entrepreneurs and the lack of traditions and trust to work with VC funds.
Underdeveloped research and innovation infrastructure and services	O: MES has done some preparatory work in preparing the national research infrastructures map, which can lead to funding of pilot projects for research infrastructures already in 2009 and 2010 through OP Competitiveness. R: Bulgarian companies are still unwilling to use R&D and innovation services. Focus in OP Competitiveness is strongly placed on physical infrastructure and much less on services, which might result in a misbalance between infrastructure availability and its usage in the future.

4 Contributions of national policies to the European Research Area

ERAWATCH country reports 2008 provide a succinct and concise analysis of the ERA dimension in the national R&D system of the country. This Chapter further develops this analysis and provides a more thorough discussion of the national contributions to the realisation of the ERA. An important background policy document for the definition of ERA policies is the Green paper on ERA¹¹ which comprises six policy dimensions, the so-called six pillars of ERA. Based on the Green Paper and complementing other ongoing studies and activities, this chapter investigates the main national policy activities contributing to the following four dimensions/pillars of ERA:

- Developing a European labour market of researchers facilitating mobility and promoting researcher careers
- Building world-class infrastructures accessible to research teams from across Europe and the world
- Modernising research organisations, in particular universities, with the aim to promote scientific excellence and effective knowledge sharing
- Opening up and co-ordination of national research programmes

In the ERA dimension, the *wider context of internationalisation of R&D policies* is also an issue related to all ERA policy pillars and is normally present in the dynamics of national ERA-relevant policies in many countries.

¹¹ Commission of the European Communities: Green paper: The European Research Area: New perspectives. Brussels 4.4.2007, COM(2007) 161final (see http://ec.europa.eu/research/era/pdf/era_gp_final_en.pdf).

4.1 Towards a European labour market for researchers

The Bulgarian labour market tightened significantly in 2007 – 2008 with unemployment rates falling below the structural unemployment mark of 6%. For instance, the unemployment rate registered in 2007 for people with tertiary education was below 3%, which is a clear indication of labour market shortage. In regard to the future of R&D in Bulgaria a major concern is the very low number of young people embarking on a scientific career. This is complemented by the processes of brain-drain and immigration, and results in continuing ageing of research staff (World Bank, 2007).

Bulgaria remains in the role of a passive taker rather than a shaper of results of researcher mobility in Europe. The introduction of free movement of Bulgarian citizens within the EU since 2004 and the availability of many EU mobility programmes has resulted in a rapid increase in the number of Bulgarian citizens, and in particular students and researchers, which have left Bulgaria to do research, study and live in the EU. The number of Bulgarian students studying abroad for example has almost tripled between 2000 and 2006, whereas the number of foreign students (EU, EEA and Candidate Countries) in Bulgaria has remained roughly the same (Innovation.BG 2009).

4.1.1 Policies for opening up the national labour market for researchers

Bulgaria has undertaken a number of coherent measures to support researchers in their career development by mainly supporting outward and reintegration mobility. These measures can be summarised in three dimensions:

1. Support by the NSF provided on a competitive basis:
 - a. Fellowships for post-doc training in foreign research organisations, conditioned on the obligation to work in a Bulgarian research organisation once the training is completed;
 - b. Strengthening the research potential of universities by attracting young people to jointly participate with experienced university staff in scientific research;
 - c. Scholarships for young scientists, who are developing a doctoral thesis within a company, thus aiming to connect science and business;
 - d. Reintegration grants aiming at creating conditions for conducting modern scientific research in Bulgaria by stimulating the return of renowned Bulgarian scientists working abroad;
 - e. Sabbatical programme to support the scientific and research activities of scientists in Bulgaria, to increase their skills, competences and knowledge, and to stimulate their professional development through performing independent research work in modern scientific centres and laboratories in other countries;
 - f. Young researchers programme encouraging the scientific development and research initiatives of young scientists and their teams;
2. Targeted measures to support new and ongoing Doctoral Programmes at research institutions and universities, as well as a Programme for Development of Post-Graduate and Post-Doctoral Training, funded through Operational Programme ‘Development of Human Resources’;

3. Support for participation of Bulgarian research teams in international and European programmes and initiatives by indirect budget schemes.

There is a clear need for developing inward mobility programmes in Bulgaria, which would help to alleviate negative trends of aging and outward mobility.

4.1.2 Policies enhancing the attractiveness of research careers in Europe

A **Bulgarian Network of Research Mobility Centres** has been set up as an integral part of the European Network ERA MORE. The network includes a National Centre, four Regional Centres and one Centre for inter-sectoral mobility of researchers. The National Research Mobility Centre has been established at the Sofia University St. Kliment Ohridski with the objective to act as an interface between the European and the Bulgarian researchers' mobility strategies.

During 2008 strengthening of all mobility centres was one of the major foci of the R&D policy of the Ministry of Education and Science. All centres expressed their readiness to provide a minimum set of services and to adhere to the principles of ERA MORE through signing a *Declaration of Commitment*.

The National Research Mobility Portal (RMP) (<http://www.eracareers-bg.net>) was redesigned in order to fulfil the recommendations made by the European Commission. Its user-friendliness was substantially improved and a jobs database in Bulgarian was added in 2008.

The Visa Package – Transposition of the Council Directive 2005/71/ES dated 12 October 2005 (on specific procedure for admitting third-country nationals for the purposes of specific research) was implemented in 2007. MES adopted an order on the rules and procedures for inclusion of national research organisations in the national list of organisations having the right to employ third-country residents on research positions.

4.2 Governing research infrastructures

Bulgaria lacks modern research facilities. The country is currently developing a National Roadmap for Research Infrastructures. The process started at the end of 2007 when a public consultation was launched for identification of national research facilities that have the potential to be further upgraded and modernised. A targeted working group was appointed by the MES to identify national research facilities that have the potential to become part of the pan-European research infrastructures or that have significant regional and/or national importance.

Over the last three years, the government has supported upgrading of research infrastructures both through institutional and project-based funding. In the period 2005-2008 the NSF has supported over 100 infrastructure projects and in addition in 2008 launched an initiative of establishing national centres of research competence, starting with support provided to 8 projects. In 2008 the MES granted access to major electronic information databases to all national research institutions and universities.

Bulgaria has an active position in the European research infrastructure roadmap projects, currently being involved as a partner in 5 identified priority research facilities. The country participates in the initiative of the Austrian Government, i.e. the

Salzburg group¹², aiming at defining regional research infrastructures, which are still not in the focus of the European Roadmap for Research Infrastructures¹³, but they are specific and would contribute to the activity of the region and its economic prosperity.

Despite well-formulated policy towards the significance and need of establishing world-class research facilities, tailored to the European priorities and infrastructures, there are still many issues to be tackled at national level:

- Improving the management of research infrastructures: many are inefficiently work-loaded and maintained;
- Establishing a precise national catalogue or database of available equipment;
- Constructing peripheral infrastructure, which is missing;
- Targeting support for the development of satellite complexes for data management in certain areas;
- Implementing measures towards the education of qualified staff to maintain the scientific equipment;
- Developing a portfolio of funds for the maintenance or construction of research infrastructures, including guarantee and loan mechanisms;
- Developing activities to increase the interest and to better involve the business.

4.3 Research organisations

The main knowledge creating institutions in Bulgaria are the universities and the non-university research institutes, most notably those within the BAS; the Agrarian Academy and the specialised national public health centres. As of 2009 there are 51 higher educational establishments in the country (of which 37 supported by the state and 14 private ones) with 13,000 researchers employed in them. In addition, a number of state institutes are linked to different executive agencies and/or ministries in order to provide specific scientific services.

Although universities have high research potential in terms of the number of R&D personnel employed, a number of barriers prevent them from realising it in practice. The share of the overall institutional budget subsidy that is channelled to the universities for research is still very low. Almost 100% of it goes to teaching. Under the system active as of 2009 the universities' state budget subsidy is allocated according to the number of students enrolled, which provides incentives for seeking quantity rather than quality in university education. Their small research budget is coupled with the issue that universities in Bulgaria are not free to grant PhDs or appoint professors. They need to get the approval of the Higher Attestation Commission, a body established back in 1972, which is one of the few remnants of central planning organisation of education in this country. This limits university autonomy for conducting research.

The Ministry of Education and Science is taking specific measures in support of universities such as:

¹² The Salzburg Forum (SF), or Salzburg Group, is cooperation among eight European countries. It was founded by the Ministry of Interior of the Republic of Austria in 2000. The countries currently meeting are Austria, Bulgaria, Czech Republic, Hungary, Poland, Slovakia, Slovenia, and Romania.

¹³ ftp://ftp.cordis.europa.eu/pub/era/docs/esfri_com_roadmap_171204.pdf

1. Establishing of centres of research competence and integrated research centres at the universities aiming at pooling the existing research potential and resources;
2. Implementing targeted competition funding mechanism for encouraging research in universities. The scheme was introduced in 2003 and there are more than 300 projects currently running;
3. Renovating research equipment;
4. Fostering the recruitment of young researchers through targeted schemes for career development and reintegration (PhD and postdoc fellowships in universities. As of 2009 there are around 45 running projects);
5. Encouraging public-private partnerships between universities and small and medium-sized enterprises;

Universities have started seeking ways to pool together scarce resources for conducting more and better research. In May 2008 three universities, namely the Sofia University St. Kliment Ohridski, the Technical University – Sofia, and the Medical University, established the Association of Research Universities. The three universities hold 43% of all projects with Bulgarian participation in FP6.

Being the largest research establishment in the country the BAS accounts for more than half of the scientific output of Bulgaria. It has the largest number of research contracts both with Bulgarian organisations and with organisations from abroad, and has received favourable appraisals in international rankings of scientific organisations. Today there are too many small institutes within BAS, and only some of them can stand the tests of international competitive pressure. Resources are not optimally allocated and there is room for efficiency gains through restructuring of BAS (World Bank, 2007). Some of the equipment in BAS entities is obsolete, and not conducive to contemporary research methods. Units are doing research on such large number of scientific areas and sectors that Bulgaria cannot afford to support all of them at once. At the same time, some of the best Bas institutes have already received international recognition, such as the status of a Centre of Excellence under EU FP6, but these are few.

Major challenges still to be addressed in Bulgarian research organizations to strengthen their position in Europe are:

1. Introducing internal merit system;
2. Setting up an international quality assessment system for the research-performing institutions which will facilitate benchmarking between them; will evaluate the cost-effectiveness and will assist the formulation of adequate research policy.
3. Developing strategic planning in terms of pooling resources in priority research areas and development of efficient system of accountability.

4.4 Opening up national research programmes

The national research funding schemes are open for development of networking activities between Bulgarian research teams and their counterparts in leading research entities in Europe. Targeted activities are eligible for funding as an integral part of running research projects and programmes aiming at development of joint training courses; transfer of knowledge and experience and mentoring from renowned research laboratories.

As of 2009 Bulgaria is actively participating in ERA-NET and ERA-NET+ schemes recognising the significance of such coordination of priority areas and funding.

In the Sixth Framework programme Bulgaria has successfully participated in 5 ERA-NET projects in the area of plant health research; polar research and urban strategies. Under the framework of the SEE-ERA.NET project for research cooperation with the Western Balkan countries Bulgaria participated in a pilot joint call initiative, now transformed in a new ERA-NET PLUS project where national contribution will reach €200,000.

In the Seventh Framework Programme, Bulgaria is partner of the BS-ERA-NET and Cultural heritage Net projects, where common pots and joint programming is a core task of the consortia.

Table 11: FP6 – ERA-NET projects: Bulgaria

FORSOCIETY	Foresight and Society ERA - NET
URBAN-NET	Urban ERA-NET - coordination of the funding of urban research in Europe
EUPHRESKO	Coordination of European Phytosanitary (Statutory Plant Health) Research
SEE-ERA-NET	Southeast European ERA-NET
EUROPOLAR	The European Polar Consortium: Strategic Coordination and Networking of European Polar RTD Programmes

Table 12: FP7 – ERA-NET projects: Bulgaria

ERACOBUILD	Strategic Networking of RDI Programmes in Construction and Operation of Buildings
NET - HERITAGE	European network on Research Programme applied to the Protection of Tangible Cultural Heritage
BS-ERA-NET	Networking on Science and Technology in the Black Sea Region

The major benefits observed have so far been:

1. Concentration of public resources in priority scientific areas;
2. Support of the scientific institutions and teams in their participation in large-scale multinational projects.

Still there is no clear engagement of the country in joint technology initiatives. One of the reasons is the underdeveloped industrial research in the country and general pattern of insufficient private funding for research activities. This, along with the lack of clearly defined priority research areas and still insufficient project-based funding, is a barrier to Bulgaria's integration into joint European initiatives.

4.5 National ERA-related policies - a summary

ERA is an integral part of the renewed Lisbon Strategy and the aims, laid down in the Partnership for Growth and Employment. Bulgaria has to ensure that its national R&D policy is consistent with ERA, aiming to encourage more investments in knowledge. Bulgaria faces most of the challenges described in the Green Paper "The European Research Area: New Perspectives".

Though the measures presented above address 4 pillars of ERA, covered by the analysis in the current report, focus has notably been placed on support to researchers, support to the upgrade of research infrastructures and support to universities to strengthen their research capacity.

Table 13: Importance of the ERA pillars in the ERA policy mix and key characteristics

	Short assessment of its importance in the ERA policy mix	Key characteristics of policies
Labour market for researchers	<ul style="list-style-type: none"> • The mobility of researchers is of high importance in ERA • Attracting a new generation of researchers to work in Europe, incl. from third countries, will support the knowledge generation processes • Transferability of social security payments from one country to another is to facilitate the mobility of researchers 	<ul style="list-style-type: none"> • Bulgaria has achieved good harmonisation of its national with the EU policy • Gender balance and non-discrimination approach are important features of the national policy • New schemes were launched in the country under the National Science Fund and OP Development of Human Resources to strengthen the country's research potential • Special measures have been launched to stimulate young researchers in the country
Governance of research infrastructures	<ul style="list-style-type: none"> • The development and approval of a legal framework on research infrastructures at the EU level is of primary importance for Europe • Sustainability of the management of the research infrastructures and ensuring open access to researchers 	<ul style="list-style-type: none"> • Recognised as a national priority in the last 2-3 years • National Roadmap is under development, currently in the process of validation • National long-term policy on research infrastructures is missing • Bulgaria is lagging behind in upgrading of the research infrastructure, though a substantial number of projects have been supported under targeted calls for proposals. • Lack of financial, industrial and human potential for the construction and maintenance of big research infrastructures. Bulgaria has the potential to be part of Europe-wide distributed research infrastructures.
Autonomy of research institutions	<ul style="list-style-type: none"> • Greater autonomy of universities • Intensifying knowledge transfer • Strengthening the link science-business • Better management to ensure better competitiveness in R&D 	<ul style="list-style-type: none"> • Additional support to the universities is needed to intensify their research activities • Financial stimuli are in place in recent years – programmes of the National Science Fund on a competitive basis
Opening up of national research programmes	<ul style="list-style-type: none"> • Very important considering the fragmentation of research activities in Europe, which results in duplication of research tasks and loss of research potential • Coordination between the different programmes is needed • Stronger focus on the ERA-NETs • Identification of joint research priorities of different member states 	<ul style="list-style-type: none"> • Lack of research priorities in this domain • Good participation in the ERA NET and ERA NET+ schemes • The future involvement of the country in the ERA NET schemes and programmes under Article 169 is important to be in line with the national priorities so as to achieve greater effect • The national research programmes are open for participation of individual foreign researchers (from both EU and non-EU countries) and part of their costs related to training and participation in seminars can be covered. This is implemented on a project-by-project basis.

5 Conclusions and open questions

The promotion of R&D and innovation is foreseen as one of the eight broad measures for delivering the National Reform Programme 2008 – 2010 objectives. Although it has been designated as one of the long-term measures, the Bulgarian government has not provided clear directions as to how the measures foreseen in the R&D and innovation area relate to long-term growth and to the measures in the other two pillars of the Lisbon Strategy – macro economy and employment. Thus the measures in R&D and innovation seem isolated from more short-term measures, e.g. no explicit link is provided to the actions for increasing foreign direct investment (FDI) financing or to improving administrative capacity although these are clearly linked to R&D and innovation. As demonstrated in this report the policy mix towards meeting national R&D investment goals and ERA related policies stands to benefit a lot from better internal and external (to other policy areas) coordination.

5.1 Policy mix towards national R&D investment goals

The current report demonstrated that the R&D policy mix employed between 2000 and 2007 has not resulted in the achievement of the national R&D investment goals defined in the National Innovation Strategy of 2004. In 2008 the Bulgarian government adopted a new ten-year R&D investment target in the Draft National Strategy for Research Development: GERD of 1.8% of GDP in 2018. The new target has been complemented by an increase in competition-based public R&D financing through NSF, NIF and OP Competitiveness and Development of Human Resources, as well as in the number of available financial programmes. While it is early to say what will be the effect of these new measures in achieving the updated R&D investment target, the current report has identified the following main barriers to R&D investment as well as imbalances and policy risks that remain unresolved:

- system interaction – the different centres of research policy making and implementation do not interact within the framework of the process of creation, transfer and adoption of new knowledge. The national research system remains fragmented and activities of the two main policy making bodies – the MES and the MEE continue to lack coordination;
- financing imbalances – public financing is primarily directed and absorbed by the public R&D sector, which without any specific performance or market –oriented targets leads to low level of R&D outputs. In addition, as the public R&D sector remains fragmented with poor governance coordination, even substantial increases in public R&D spending fail to materialise in an increase in the average R&D project value. Public R&D tends to be distributed thinly to many public R&D units without thematic focus, which fails to produce critical mass. This hinders the link between private and public organisations and does little to boost private R&D expenditure.
- human resources – the Bulgarian R&D system is characterised by an insufficient number of researchers, with an aging profile and predominance of public sector employment. The lack of financial stimulus and inadequate research infrastructure make Bulgaria unattractive for young talents and leading researchers and do not contribute to a return of Bulgarian experts who have chosen a professional career abroad.

5.2 ERA-related policies

ERA and ERA-related policies are gaining on importance in the overall Bulgarian national research policy mix. The main driving force behind this development however is the pull of EU initiatives, such as national mobility portals and ERA-NETs rather than the push of nationally defined objectives and priorities. National policies remain underfunded. Although financing for ERA-related policies has increased recently, the average project value in national mobility schemes amounts to €0.01m to €0.015m. ERA-related policies have received a substantial boost through the realisation of OP Development of Human Resources through financing from the European Social Fund.

So far the main contribution of Bulgaria's ERA-related policies has been associated with outward mobility and reintegration, directed primarily at Bulgarian researchers, which has been reinforced by the participation of Bulgarian researchers in EU financed mobility programmes. Bulgaria still misses a national policy on research infrastructures, although the MES has started preparing a National Roadmap of Research Infrastructures. The increasing number of measures in support of research infrastructure after Bulgaria's accession to the EU in 2007 still lacks unified coordination and strategic guidance.

There are a number of challenges that the Bulgarian R&D system faces in relation to ERA development:

- Bulgaria is lagging behind the EU in regard to the **availability of highly skilled researchers**. With regard to the future of R&D in Bulgaria a major concern is the very low number of young people embarking on a scientific career. This challenge is exacerbated by continuing trends of brain drain coupled with the ageing of research staff;
- **Autonomy of research institutions**: Although universities in Bulgaria hold a substantial human potential for research they are still primarily involved in teaching. A major drag on the universities' research potential is with their lack of autonomy to produce PhDs and appoint professors. According to a 1972 law, universities in the country need to get approval by the Higher Attestation Commission for appointing professors, which limits their autonomy for conducting research.

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List of Abbreviations

BAS	Bulgarian Academy of Sciences
BERD	Business expenditure on R&D
BGN	Bulgarian New Lev
CEC	Commission of the European Communities
CIP	Competitiveness and Innovation Programme
COST	European Cooperation in Science and Technology
CREST	Commitee de Recherché Scientifique et Technique
EEA	European Economic Area (Iceland, Norway, Switzerland)
EMBASE	An abstract and indexing (A&I) database specialised in the biomedical field, and excels in its coverage of pharmaceutical research
ERA	European Research Area
ERAMORE	The European researcher's mobility portal
ERA-NET	The ERA-NET Scheme is about the coordination and cooperation of national and regional programmes and as such, it aims at the national and regional programme makers and managers (for more information, please visit http://ec.europa.eu/research/fp6/index_en.cfm?p=9_eranet)
ERP Fund	European Recovery Programme Fund

EU	European Union
FDI	Foreign direct investments
FP	European Framework Programme for Research and Technology Development
GBAORD	Government Budget Appropriations or Outlays on R&D
GDP	Gross Domestic Product
GERD	Gross expenditures on research and development
HEI	Higher education institutions
HES	Higher education sector
ICT	Information and communication technologies
IPR	Intellectual property Rights
JEREMIE	Joint European Resources for Micro to Medium Enterprises initiative
MEE	Ministry of Economy and Energy of Bulgaria
MES	Ministry of Education and Science of Bulgaria
NGO	Non-governmental organisation
NIF	National Innovation Fund
NSF	National Science Fund
OP	Operational programme
PRO	Public Research Organisations
R&D	Research and development
RDI	Research, Development and Innovation
RES	Renewable energy sources
RMP	Research Mobility Portal
RTDI	Research, Technological Development and Innovation
S&T	Science and technology
ScienceDirect	An information source for scientific, technical, and medical research (for more information, visit www.sciencedirect.com)
SCOPUS	The largest abstract and citation database of research literature and quality web sources. It's designed to find the information scientists need. (For more information, visit http://info.scopus.com/)
SF	Structural Funds
SME	Small and medium-sized enterprises
VC	Venture capital
Web of science	An online academic service, whose databases cover almost 10,000 leading journals of science , technology , social sciences , arts , and humanities and over 100,000 book-based and journal conference proceedings

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Abstract

The main objective of the ERAWATCH Policy Mix Country reports 2009 is to characterise and assess in a structured manner the evolution of the national policy mixes in the perspective of the Lisbon goals, with a particular focus on the national R&D investments targets and on the realisation and better governance of the European Research Area. The reports were produced for all EU Member State and six Associated States to support the mutual learning process and the monitoring of Member and Associated States' efforts by DG-RTD in the context of the Lisbon Strategy and the European Research Area. The country reports 2009 build and extend on the analysis provided by analytical country reports 2008 and on a synthesis of information from the ERAWATCH Research Inventory and other important available information sources.

This report encompasses an analysis of the research system and policies in Bulgaria.

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