GREECE

1. General policy framework

The state effort for the formulation and implementation of a science and technology policy is shared by several authorities (General Secretariat for Research and Technology, Ministry of National Education and Religion, Ministry of Agriculture, Ministry of Health and Welfare Services etc.).

Although the Ministry of National Education and Religion exerts a great influence to the national research system due to the large share of universities in the total R&D effort, the only body that has achieved to formulate a cohesive research and technology policy in Greece is the General Secretariat for Research and Technology (GSRT), which has the adequate structure and mechanisms to work out and implement Operational Programmes on research and technology.

The GSRT is a part of the Ministry of Development and its tasks extend from the areas of academic and industrial research to technology transfer and innovation. It derived from the Ministry of Research and Technology in 1985, when this latter was merged with the Ministry of Industry and Energy, after three years of autonomous existence. This fact demonstrates the government’s intention to facilitate the interaction of R&D with the economic and -in particular – the industrial development of the country.

The GSRT has a separate budget of its own and does not exercise any authority over research undertaken by other ministries.

It manages the implementation of the Law 1514/1985 “on the development of the scientific and technological research” which aims basically at promoting the modernization and upgrading of research and technology activities, according to international standards. No major reforms have been introduced since 1985 concerning the legal framework governing the operation of research centers.

However we should mention:

– Law 1733/87 on patents, which establishes the Industrial Property Organisation.

– Law 2121/93 on copyright etc.

– Law 2545/97, article 25, which establishes the possibility for a legal entity of the private sector to get government support for its participation in any R&D Programme launched by the GSRT.

– Law 2741/99, article 23, which introduces a new framework for the creation and functioning of Science and Technology Parks and spin off companies.

In 1999 the government decided to proceed to the creation of an interministerial body with main objective the co-ordination of research policies emanating from different ministries. However, the above decision has not been implemented yet.
The Science and Technology policy of the GSRT in the context of the Community Support Frameworks

Since 1989 the national S&T policy was supported by an important inflow of the EU structural funds. In fact the EU funds for RTD (Structural funds plus Framework Programme) started gaining in importance in the financing of R&D activities in Greece. Links between national and EU RTD policies have been strengthened during this last period.

In the 1990’s the two Operational Programmes for Research and Technology (EPET I and EPET II) under the respective CSFs, as well as the initiative STRIDE HELLAS, have been the main instruments for the formulation and implementation of a science and technology policy in Greece. As a matter of fact they defined the main policy guidelines, specified them to the level of concrete targets (measures), and provided for the necessary funds and evaluation/management procedures concerning the implementation of the above measures.

The medium term policy on research and technology for the second part of the 1990’s is formulated within the Operational Programme for Research and Technology (EPET II) under the 2nd Community Support Framework (1994-1999). It is the main national policy document on R&D of the Greek state, reflecting policy choices on research and technology and expressing them in terms of specific targets (measures).

The strategic goal of EPET II is to improve the competitiveness of the Greek industry and Greek economy as a whole.

The main policy guidelines, as they are described in the EPET II, are the following:

− Enhance cooperation between research organizations and production units in carrying out large R&D projects of high economic interest.

− Encourage technology transfer from abroad to Greek firms.

− Reinforce the innovative capacity of Greek firms and support all stages of the innovative process.

− Introduce promotion and assessment mechanisms regarding the outcome of government funded scientific research.

− Support and restructure the existing research and technology institutions so that they can face the challenges and the needs of specific economy sectors presenting comparative advantages for the Greek S&T system. Given the over concentration of research and technology activities in Attiki an effort would be made towards the optimisation of the geographical distribution of the respective infrastructure, as well as the promotion of the regional aspects of the research and technology policy.

− Assess the present training needs of the Greek human potential, and carry out substantial training programmes in new technologies and techniques. Special incentives should be given for carrying out applied post-graduate research by young researchers.

− Support the assimilation of new techniques in communication, information and expression, which result from technological innovation. Promote, through the process of education, the role of science and technology in society, as well as the importance of innovation, inventiveness and initiative.
The total budget of the Programme amounts to Euros 544 million.

**Main characteristics and recent trends of the GSRT policy**

Although public funding of R&D in Greece remains unacceptably low compared to the rest of the countries of the European Union, considerable progress has been achieved in Greece during this last decade in developing science and technology policies, mainly as a result of the implementation of the above Operational Programmes.

There has been a shift in research funding from basic to more focussed research work. The national interest for the socio-economic utilisation of research results has increased considerably in EPET II. Co-operative research projects involving links between firms, research establishments and universities have been used with the aim of fostering networking and access to research results. Several of the latest financial schemes, still in an experimental phase, address the needs of the demand side of the market, while at the beginning of the 1st CSF the measures launched supported mainly the R&D supply side. It also seems more and more necessary not only to support research activities but also to foster the ability to technically support the production sector, to offer technological know-how and demonstrations and promote innovation activities.

As far as it concerns the mechanisms used to induce R&D performance there has been in R&D policy a process of shifting the emphasis from institutional funding towards project funding.

Monitoring and evaluation of the efficiency and impact of programmes and research organisms are gaining in importance although they are not yet fully integrated in the policy formulation procedure.

R&D policies have been traditionally horizontal in Greece. However some sectoral aspects of these policies have started to emerge even in a fragmentary way.

This considerable public effort during the last twenty years has undoubtedly contributed to the modernization of the infrastructure and the fostering of R&D activities. It also seems that it has provoked a change of attitude among Greek entrepreneurs concerning research and technology. However no special studies have been undertaken yet to demonstrate if the above effort has been converted into actual improvements in productivity, employment, national income or the competitiveness of Greek enterprises.

The new Operational Programme covering the period 2000-2006, aims at enhancing the competitiveness at two levels:

- Individual business firms.
- National and regional economy level.

The latter includes the competitiveness of research and technological institutions in the world economy as providers of knowledge intensive services.

More precisely the new O.P. should reinforce the existing and contribute to create new networks of technological and research activities generating international competitive advantage, and assist research teams to commercialize the results. The O.P. has to further motivate the business sector in increasing its contribution to the gross expenditure on R&D from the actual 20% approximately to 30% (in terms of funding) at the end of the programming period. This has to be linked to the diversification of the productive sector towards more knowledge based activities. Further development of existing research centres or creation of new ones will be subject to criteria of fewer fields and explicit interest of businesses. It will also include measures to raise awareness of entrepreneurs, managers and the general public on the
use of technologies, to increase the skills and the number of highly qualified research personnel employed in business. Researchers will be informed on legal issues of intellectual property, as well as on ethics, commercialization, research management etc.

Training will be provided to entrepreneurs and managers as a complement to actions of technology transfer, demonstration and commercial promotion, with a view to accelerate the use of research results and new technologies. Opportunities will be provided for the transfer of technology in terms of integration of highly skilled researchers from abroad into the Greek research and technological development system. The monitoring of the science and technology labor market will be organized on a systematic basis. In particular a systematic effort will be undertaken for the identification of skill gaps in the Greek Science and Technology sector.

It seems more and more necessary that there should be a concentration of future funding on the most promising fields of science and technology for Greece, while an attentive monitoring and evaluation procedure should lead to the selection of the most successful financial schemes having the greatest relevance to the specificities of the Greek S&T system.

2. Support of the science base

The research centers which are supervised by the GSRT constitute a main element of the Greek research infrastructure. The establishment and the continuous expansion of this infrastructure has always been one of the key instruments of the Greek R&D policy.

The seeds of a new policy concerning the further development of the national research structure can be found in the 3rd Sub-programme of the EPET II which was allocated with a budget of about Euros 129 million and provided for:

The reorientation, the restructuring and – eventually – the expansion of the existing research infrastructure, which should be carried out selectively on the basis of expert studies evaluating – among other things – the investment incurred until now in the existing research centers, the perspectives of these centers, their contribution to the economic and technological upgrading of the country, the international achievements of their research teams etc.

The establishment of new R&D institutions, complementary to the already existing ones. A special effort should be made for a more rational expansion of the R&D infrastructure into Epirus, Macedonia, and Thrace (Northern Axis) as well as into the southern regions of the country (Southern axis) in order to palliate the asymmetric regional distribution of research activities.

Within the above framework, the GSRT supported the improvement and expansion of the physical infrastructure of the public research centers which have been extensively equipped with modern facilities. It also established during the last two years (1998-2000) five new research centers outside the Greater Athens area, aiming at addressing modern production and society needs. These are:

- The Ioanina Biomedical Research Center (in Ioannina).
- The Cultural and Educational Technology Institute (in Xanthi).
- The Institute of Industrial Systems (in Patra).

– The Center for Research and Technology Hellas (in Thessaloniki) disposing 4 Institutes.

Moreover, a broad range of financial schemes of the GSRT – in their great majority similar to those addressed to the Universities – are addressed to (or involve the participation of) the Public Research Centers. The allocation of funds, through the above schemes, occurs on a competitive basis promoting thus excellency as the main criterion for the selection of projects.

A special mention should be made to the “Programme for the Support of Laboratories providing S&T Services”, announced in 1995 and addressed to the research laboratories of the Higher and the Technological Educational Institutions and of the Research Centers supervised by the GSRT which disposed of an adequate physical and organizational infrastructure and had already developed activities concerning provision of S&T services to the industry or other sectors of the economy. The aim of the Programme was to support the physical infrastructure of the above laboratories so as to improve the quality of the services they provide and enhance their capability to satisfy specific needs of the production system.

As far as it concerns the Greek universities, the greater part of their R&D activities is financed by the Ministry of National Education and Religion. It is worth mentioning that this grant does not consist a dedicated, earmarked funding for research but comes by apportioning the funds coming from the Ministry of National Education and Religion among the different activities of the R&D personnel.

During the period 1994-1999 the implementation by the Ministry of National Education and Religion of the Operational Programme for Education and Initial Vocational Training (EPEAEK) boosted the development of post-graduate studies. Nowadays about 200 post-graduate programmes are under way, half of them being financed by the above Operational Programme after specific announcements and evaluation of the submitted proposals.

As far as it concerns the system of tertiary education in general, the Operational Programme for Education and Initial Vocational Training included a package of measures aiming at the improvement of the curricula, the upgrading of the system of scholarships, the development of libraries, the introduction of telematic services in the universities, the establishment of an Open University in combination to distance-learning procedures, the introduction of flexible cycles of education offering more choice opportunities to the students and the improvement of the administration of the universities.

One of the main aims of the Programme was the intensification of the links between the education and the production system and the introduction of new technologies in all levels of the education.

A Centre for Educational Research was established in 1995.

The GSRT is another important source of financing of R&D in the tertiary education institutions, through the funding of specific project-based research programmes, influencing thus the intensity and direction of R&D activities in the universities.

These research programmes aim at keeping the university laboratories alive, upgrading their research equipment, encouraging young graduates to integrate research teams, reorienting academic activities towards areas of special national relevance, and improving the linkages of the universities with other elements of the S&T system, especially the potential users of research results.
3. **Links between science and industry**

In the last decade the GSRT has promoted an important set of various types of measures aiming at increasing the liaison activities between higher educational institutions, public research establishments and the business enterprises.

The main sets of measures could be classified as follows:

1. **Launching of public programmes supporting co-operative research** between higher education institutions, research centers and enterprises.

   The philosophy of linking academic or research institutions with potential users of the research results has been incorporated in many programmes of the GSRT in the last years (e.g. Programmes EKVAN, SYN, YPER, NETWORKS OF R&D LABORATORIES, PAVE which encourages the enterprises to subcontract a part of an R&D project to a research or academic institution or a sectoral RTD company, even in the Programme PENED which supported till now basic research activities).

   The underlying hypothesis is that the R&D results are more effectively exploited when potential users participate in the conception and execution of projects.

   One should also mention the EU Initiative STRIDE HELLAS (1990-1993) which first introduced in the Greek research policy the promotion of research consortia involving more complex linkages between research and non research organizations.

2. **Creation of intermediary organisations** for the transfer of knowledge and information from the "producers" to the "consumers" (sectoral RTD companies, Science and Technology Parks).

   In the last years the GSRT has also supported the establishment of Liaison Offices in the universities and research centers with the objective to assist the above institutions in the promotion of the exploitation of the results of their research activities.

4. **Incentives and support for R&D**

   **Tax Treatment of R&D**

   Research and development expenses as well as expenses having to do with the utilization of research results and the acquisition of new technology (royalties and fees paid for the use of licenses, know how, technical aid, patents, etc.) are considered as deductible expenses for the estimation of taxable profits of Greek enterprises (Law 2238/1994). However supplementary measures (concerning mainly the definition of appropriate criteria to describe R&D activities) are needed for the application of the above legislation.

   **Measures to establish public/private partnerships in R&D**

   Any of the policy measures applied by the GSRT under the EPET II are addressed directly to the enterprises in order to promote their scientific, technological and innovative capabilities.

   The enhancement of the R&D activities of the production sector of the economy is considered an important priority aim of the GSRT policy, with the hope that the strengthening of the demand side will act as a catalyzer for the development of the other elements of the S&T system.
The target set by the Greek government has been to increase by the end of the EPET II the contribution of the business sector in the formation of GERD to about 30%. However the intrinsic difficulties of the whole effort are well recognised.

A broad range of financial schemes elaborated and managed by the GSRT (e.g. the Programmes PAVE, EKVAN, YPER and SYN etc) require necessarily the participation of enterprises in the implementation and financing of the research undertaken and/or the exploitation of research results.

The definition of sectors of priority

It should also be pointed out that the First Sub-programme (about Euros 156 million) consists an important instrument for the implementation of a sectoral S&T policy, since it focuses the R&D effort on specific carefully selected sectoral fields of high economic interest.

The designated priority areas are the following:

- Environmental technologies.
- Life sciences (more specifically, health and agriculture, with emphasis on biotechnology applications).
- Information technologies and applications in product manufacturing and supply of services.
- New or improved materials and new production and process methods.
- Analysis of the social, economic, administrative and cultural features of development.

The above thematic areas give very general technological orientations to the researchers, without determining specific sectors of application since the definition of more detailed targets require special procedures, according to the needs and the particular features of each area, which have not been introduced yet into the Greek policy planning process.

The GSRT is trying to further refine its sectoral policy, through the elaboration of Special Actions, combining both research, technology transfer and demonstration activities, in fields of special national relevance. In this direction the GSRT has launched during the last years sectoral calls for proposals concerning "The role of enterprises and markets in the economic development", "Food and Nutrition", "Transport", “Management of Agricultural and Industrial Waste”, “Information Technologies” as well as Special Actions in "Language Technology", in "Assistive Technologies for Disabled and Elderly People", in "Microelectronics industry for specialized systems" and in "Agricultural Biotechnology".

It is evident that the promotion of the Information Society is one of the main orientations of the recent GSRT research and technology policy.

It seems that the process of prioritisation in Greek S&T policy is an issue which will receive considerable attention in the years to come.

5. S&T information diffusion and networking

Two main complementary actions are launched by the GSRT in order to create the appropriate infrastructure and improve the efficient distribution and utilization of knowledge in the Greek S&T system;
the creation of the **Greek Research and Technology Network** and the **National Information System for Science and Technology**.

The development of a **Greek Research and Technology Network** named GR-NET (EDET) was first launched as a project of the EPET II aiming at establishing the basic infrastructure for upgrading INTERNET connectivity for Greece and providing high level network services to the academic and research institutions as well as the R&D departments of relevant organizations. It is considered an important step for Greece towards the Information Society.

It must also be pointed out that Greece has proved to be a nodal point as far as it concerns the connection of the countries of Central and Eastern Europe to INTERNET. In 1998 a GR-NET S.A. (Société Anonyme) company was set up for the operation and management of the network.

**The National Information System for Science and Technology** is considered a project of exceptional significance for the development and modernization of the Greek S&T system.

It consists of the promotion of an integrated set of mechanisms and procedures which should ensure:

- The efficient flow of S&T information to the scientific community of the country through electronic channels.
- The gathering of the S&T output of the research system, its storage in appropriate data bases and its dissemination to every interested party, with particular emphasis to enterprises.

Its implementation is based mainly on the infrastructure and experience of the National Documentation Center, under the supervision of the GSRT.

The GSRT also promotes, as a complementary action to the National Information System for Science and Technology, the modernization and extension of the libraries of the Greek research centers it supervises.

**Other GSRT activities promoting networking and the dissemination of S&T information:**

In Greece certain characteristics of the S&T system, that is the small size of the national research community, combined to the broad dispersion of the research effort to multiple sectors and themes, the weak communication links among research laboratories, even of the same organization, as well as between the research and production systems, constitute a handicap to the dissemination of information.

The Programme Human Networks for the Dissemination of S&T Knowledge, launched in 1995, which supports the creation of “thematic” networks, where participate both the supply and the demand side of S&T knowledge, can be considered as a pilot step towards the improvement of this situation. It is hoped that the relationships it enhances, which at the beginning included mainly exchange of information, will mature by the end of the programme and lead to more permanent forms of linkages.

Another scheme first launched in 1997 promotes the networking of R&D laboratories of different institutions of the public or the private sector, carrying out similar or complementary S&T activities, with the purpose to enhance the joint use of expensive and large scale instruments.

The GSRT plays also an important role in the diffusion of information concerning research and technology matters in Greece through:

- A monthly newsletter about the activities of the GSRT addressed to Greek scientists, in Greece or abroad.
− A bi-annual bulletin in English addressed to English speaking scientists beyond the borders of Greece.

− Several special issues and demonstrations.

The GSRT also takes part to exhibitions presenting Greek high technology products and services which are the result of research projects, organizes or finances special workshops etc.

6. Promotion of Technology Demand

Several mechanisms encouraging technological development and innovation in Greek enterprises have been gradually set up during the last years. Also some progress has been made towards the coordination of different policies having a technology stimulation dimension.

The Operational Programme for the Industry under the Community Support Framework for Greece (CSF) (1994-1999) focussed on improving the conditions underlying the competitiveness of Greek industry through a well articulated and coherent set of measures trying to address its structural deficiencies. The modernization of the physical infrastructure is pursued together with the improvement of processes, organisational patterns and the business environment as a whole.

However, certain policy measures continue to be fragmentary and there is still need to improve the integration of technology policy into other areas of industrial or fiscal policies.

The technology promotion dimension of the GSRT policy is mainly expressed in the second Sub-programme of the EPET, which forms the bulk of the budget of the overall Programme. As a matter of fact Euros 191 million have been earmarked for this 2nd Sub-programme which covers a very wide range of activities from collaborative research, science parks and intermediate (between research and production) organizations, to electronic networks, data-base development, technological culture and international S&T co-operation.

The emphasis however is set on the promotion of innovation and technology transfer through financial schemes for demonstration projects, technology brokerage and benchmarking. For the time being, not all of the measures provided by this Sub-programme have been further elaborated. Some of them need for their implementation more coordination with the Operational Programme for the Industry.

The Development Laws

The main expression of the industrial policy in Greece in the last decade has been a wide range of incentives for investments provided by a series of different laws («development laws») which have been amended quite often in order to introduce new elements suggested either by the experience of the implementation of the previous laws or by the necessity of harmonization of the development legislations among the EU member countries. The most recent amendment was introduced by the Law 2601/98.

The development laws aim at stimulating investment through different types of aids and – simultaneously – at promoting regional development by the variation of the level of the aid, depending on the region where the investment will be carried out.

The GSRT participates in the evaluation procedure of investment proposals under the «development» Law 2601/98 giving its expert opinion for the characterization of certain investments as eligible for state aid
(e.g. investments concerning the manufacturing of products or the provision of services of highly advanced technology, investments for the manufacturing of new products, investments by software enterprises etc.)

**Venture Capital**

The institution of venture capital enterprises was first established in Greece under Law 1775/1988 (amended by Law 2166/93) in order to support high technology or innovation investments. However financial organizations and the market have not exploited till now the incentives provided by the above law for the promotion of technologically promising productive activities. As main reasons for these poor results are considered the insufficient sensitisation of the Greek firms concerning the above institution, the real difficulties in the co-operation between firms and venture capital enterprises, the complicated and time-consuming procedures necessary for their authorization etc.

Improvements of the existing legal framework were introduced under Law 2367/95 which extends the institution of venture capital beyond the areas of high technology and innovation. It also provides for special state subsidies to venture capital enterprises that participate in the capital increase or the establishment of companies undertaking investments in advanced technology or innovation activities in Greece. The new legal framework provides that the expert opinion of the GSRT is needed for the assessment of the character of the above investments.

7. **Enhancement of the Human Capital in R&D**

Although post-graduate university studies, under the responsibility of the Ministry of Education, are the main instrument for the training of researchers, a more applied form of training, having mainly the form of «training through research», is pursued by the GSRT through several financial schemes (PENED, YPER, DIAVLOS, PAVE).

A special mention should be made to:

- The new financial scheme (launched in 1998) titled «Career Award to Greek-speaking researchers working abroad» aiming at attracting to Greece distinguished young researchers, having at least a two-years post-doctoral research experience abroad, in order to join research teams in Greek universities, research centers or institutes and carry out specific and well-defined research, technology and training activities. The knowledge of the Greek language is considered as a strong cultural link between those scientists and Greece. Thus it is expected that Greek – speaking researchers will be interested in moving to Greece for a rather long stay (three years). Their integration in the Greek research system is expected to give an impetus to the activities of Greek research teams.

- The Programme Technomatheia which was launched in 1995 to promote the diffusion of the notion of technological culture to the youth of Greece and encourage talented young people to grow into the future researchers or technologists of the country.

8. **International Co-operation**

The Greek research system receives large inputs from abroad, confirming in that way its increasing attachment to the international and especially the European Union orientations, mainly due to the widening of the structural programmes role in science and technology and the increasing absorption of funds from the Framework Programme.
The European and international R&D cooperation policy of the GSRT

International co-operation and especially the EU Framework Programmes consist an important channel of technology transfer from (or to) the country bringing together suppliers and users of technology.

Participation of Greek research teams in the European Commission RTD Programmes has grown substantially over the years. Universities and research centers account for the overwhelming majority of absorption of the Framework Programme support, while industrial participation, although steadily increasing over the years, remains, nevertheless, below expectations. However the needs of European competitiveness in research and technology change rapidly and make cooperation between researchers and enterprises even more essential for the successful completion of research projects and the effective exploitation of their results. This perspective makes even more crucial the boosting of the participation of Greek enterprises in European RTD consortia.

The Bilateral Co-operation Programme of the GSRT

This form of cooperation concerned at the beginning a large number of exchanges of scientists between Greece and other countries, and only a small number of common research projects, carried out on the basis of inter-governmental bilateral cooperation agreements. Nowadays the Bilateral Cooperation Programme of the GSRT finances an increasing number of integrated research projects and sets particular emphasis on the participation of enterprises.

The main objectives of the above Programme are among others:

- The transfer of technological know-how to and from Greece.
- The development of international R&D networks.
- The development of industrial and commercial cooperation and the opening of new markets.

More precisely the GSRT, through the Bilateral Co-operation Programme, encourages the Greek scientific and industrial institutions to develop research collaboration with relevant institutes abroad, in countries members of the EU, the Central & Eastern Europe, countries of the former Soviet Union, as well as with industrialized and developing non-European countries. The number of countries with which there are bilateral cooperation agreements in S&T is steadily increasing. At present the framework of the Bilateral Cooperation Programme of the GSRT supports research cooperation with France, Germany, Britain, Italy, Spain, Albania, Armenia, Bulgaria, Hungary, Romania, Czech Republic, Slovak Republic, Russia, Israel, China, Cyprus, Slovenia, F.R. of Yugoslavia, Poland, Ukraine, Georgia.

Moreover during 1995 the multilateral co-operation with the Black Sea area was launched within the framework of the Black Sea Economic Cooperation initiative in which Greece is an active member.

Greece participates as well to the Asia Europe Meeting, a multilateral forum of 24 Member countries from Asia and Europe: the enhancement of cooperation in science and technology is considered as a priority in the activities of this forum.

The Bilateral Co-operation Programme will soon include some countries with which agreements of S&T co-operation have been recently signed or are under preparation (Mexico, Turkey, Egypt). Furthermore the GSRT plans to extend the spectrum of its bilateral co-operation and include additional countries at the Balkans, the Mediterranean region and North America.
9. Policy evaluation

The concept of ex post evaluation of publicly funded R&D has also gained in importance during the last years. Pilot studies were undertaken concerning the determining of the quality and effectiveness of specific research programmes (e.g. PAVE) of operational programmes (1st EPET and STRIDE), as well as the performance of research establishments and sectoral RTD enterprises supervised by the GSRT. Especially the evaluation of the 1st EPET and of STRIDE were considered as major operations in the GSRT, carried out by 47 appraisal committees made up of external experts, officials of the GSRT and financial auditors.

It is too early to judge whether the results of the above studies will be utilized for the feedback of the policy formulation procedure and whether they will contribute to the efficient allocation of future funds.