CENTRE for RENEWABLE ENERGY SOURCES

ΚΑΠΕ
CRES

ANNUAL REPORT 2005

Planning 2006

Statistical Data for RES & EE

TABLE OF CONTENTS

List of tables

List of figures

1. INTRODUCTION

1.1. BRIEF PRESENTATION OF THE CENTRE

The Centre for Renewable Energy Sources (CRES) is the Greek national Centre for Renewable Energy Sources (RES), Rational Use of Energy (RUE) and Energy Saving (ES). The creation of CRES was provisioned in the article 25 of Law 1514/1985 on "Scientific and Technological Research Development" and it was implemented by Presidential Decree 375/1987.

According to the current Presidential Decree, the Centre is managed by a seven-member Administration Board, which is appointed by the Minister of Development for a three-year period. Currently, an amendment of the Presidential Decree is being drafted in order to adjust the Centre to the new needs which have arisen over time.

The main goal of CRES is the promotion of RES, RUE/ES applications at a national and international level, as well as the support of relative activities taking into consideration the environmental impacts, in the production/transfer/energy-use chain.

According to Laws 2244/94 "Regulation of issues on electricity from RES" and Law 2702/99 "Various regulations of issues pertaining to the Ministry of Development and other provisions", CRES has been designated as the National Coordinating Centre for its fields of pertinence. CRES is staffed by a group of 120 high experienced and specialized scientists.

Since 1992, CRES is located on its wholly owned premises at 19th km Marathonos Ave, Pikermi, Attica. In addition to over 3,700 m^2 of main office space, the centre also has experimental outdoor installations, specialized laboratories for energy technologies, a library, conference rooms and a strong computing infrastructure.

CRES has also installed a demonstration Wind Park, in the area of Agia Marina in Keratea, Attica combined with a Hydrogen plant running on wind energy and connected to the medium voltage network of the Public Power Corporation (PPC), where the produced electricity is sold. The hydrogen plant was inaugurated by Mr. Dimitris Sioufas, the Minister of Development on November 19th, 2005.

1.2. INTERNATIONAL DEVELOPMENTS AND NATIONAL STRATEGY ON RES AND ENERGY SAVING

During the first decade of the 21st century, the European economies are called to proceed with new energy investments, in order to deal with thei ever growing energy needs, as well as the replacement of the existing power generating installations.

Such investments will inevitably impose choices to be made between energy technologies and products which will have an impact both on the infrastructures of the European economies, but also on the energy sector over the next 30 years.

The energy options of the European Union depend on the international framework, the enlargement so to include 30 member-states of very different energy structures, but mainly on the new reference framework of the energy market, the **liberalization of the energy markets and the environmental commitments**, as well as the promotion of large projects which may render Greece an international energy hub in oil, natural gas and electricity.



Especially concerning Greece, the energy sector constitutes one of the most dynamic and important sectors from the point of economic activity. The main characteristics of the Greek Policy in this sector are related to the greenhouse emissions control, as well as to the reduction of the carbon intensity in the Greek Energy system and they are achieved by the use of natural gas, the promotion of RES investments, Energy Saving and Cogeneration of Heat and Power (CHP) measures. Briefly, the **national actions** concern an intensive Energy Saving plan in the demand sector and an aggressive investment policy for direct support for RES and natural gas.

Special actions that have been carried out in power generation are aiming for the improvement of the existing lignite plants performance, the penetration of natural gas and RES, as well as at the increase of the CHP potential. In the demand sector, the underway actions focus upon energy saving interventions in the tertiary sector, housing, industry and transport. More specifically, the actions concern:

- buildings: energy certification of buildings, setting-up of specifications and standards, use of energy efficient techniques and materials on the shell, substitution of electricity and heating oil with RES and natural gas, the labeling of home appliances and the application of cogeneration in large buildings;
- industry: the substitution of heavy oil by natural gas, the increase of the Cogeneration potential, the improvement of efficiency in production processes;
- transport: improvement of the infrastructure and public-transport and the use of alternative fuels.

For the implementation of the Energy and Environmental Policy, a series of legal and fiscal measures have been adopted. Over the last few years, the main financial tools have been

the Operational Programme for Energy, the new Development Law 3299/94 and the Operational Programme for Competitiveness, while Laws 2244/94 and L. 2773/99 provide the necessary legal framework. In particular, Law 2773/99 that sets the rules for the Greek electricity market liberalization, provisions that after February 2001, any private investor wishing to produce electricity, can do so, after obtaining a license from the Regulatory Authority for Energy (RAE). The Transmission System Operator is obliged, as stated by a special provision, to give priority access to the grit to RES produced electricity.

The results of the combination of a favorable legal framework, fiscal measures and a significant RES potential in Greece, was the burgeoning interest, over the past decade that was shown for investments on RES generated power. The first important boost for investments in the sector was given through the Operational Programme for Energy of the Ministry of Development (1994-1999), whereas the Development Law 2601/98 constituted the necessary funding tool, linking the extent of financial support of the investments with the geographical region where these were to be locatted.

Following the implementation of the Operational Programme for Energy, the Operational Programme for Competitiveness was launched in the year 2000, in the framework of the 3rd Community Support Framework. The total Operational Programme for Competitiveness budget for RES, RUE and small scale cogeneration (<50 MW_e) is in the order of 1,07 billion € for the 2000-2006 period of which, 35,6% or, 382 million € are state funds.

Accordingly, a new Measure was adopted in 2004 pertaining to the connection of RES and Cogeneration energy investments with the System or Network from the Measure 6.5 "RES system penetration promotion in the national energy system" with an initial budget of € 50 million. Last, but not least, the Development Law 3299/04 provides regulations in favour of RES investments. The amount of the state contribution granted depends on the geographical region where the investment is supposed to take place, as well as the size of the installation etc.

The big challenge for RES in Greece today is the implementation of the Community Directive target for RES generated electricity (2001/77/EC), according to which, Greece should increase the RES share in electricity generation to 20,1% (including the large hydroelectric plants) by the year 2010. This target, however ambitious, is feasible.

Another important parameter of the Greek energy policy over the last years is the promotion of Energy Saving and RUE measures and programmes. The adoption of European Directives has set the legal framework for the adoption of ministerial decisions on energy labeling in Greece, while the legal framework for energy planning has been completed by passing Law 3438/06 for the creation of National Council for Energy Strategy as an opinion giving authority for the design of a long-term energy policy, as well as the forthcoming certification on energy efficiency of buildings, which is near completion. On the other hand, a large number of measures concerning transport have been adopted with the completion of Law 3423/05 on biofuels, the renewal of old private cars and the improvement of the specifications of the road network and the vehicles of mass transport.

1.3. THE CONTRIBUTION OF RES IN THE ENERGY BALANCE THE RES SITUATION IN GREECE

The contribution of RES in the energy balance of Greece ranges at 5% with regard to primary energy supply and 13-14% in respect to the domestic primary energy production. The RES contribution to the electricity produced in Greece has been increasing considerably in the last years and ranges between 2-2,5% of the gross domestic electricity consumption. It mainly concerns Wind and Small Hydros, Biomass in a smaller range, while soon Geothermal Energy is expected to have its share.

Taking into consideration the large hydroelectric installations (excluding pumped storage), the electricity production from RES reaches the levels of 10%. Thermal energy production from RES is mainly derived from solar-thermal systems, thermal use of biomass and geothermal heat pumps. The considerable development of the Greek solar-collector industry in the past few decades has led Greece to the second position of solar-collector installed surface on a European level.

However, the main biomass heat production comes from combustion of non-commercial biomass, in the domestic sector, or through biomass residues from wood-processing plants, food industries, cotton plants etc., where it is used to cover own needs. It could be stated that the Greek RES heating market is in its infancy. The biofuels use in Greece is also in early stages of development and a study for its market penetration is being completed. Two bio-diesel production plants are currently under way, financed by the Operational Programme for Competitiveness.

The installed power of electricity production from RES by the end of 2004 was 3,593 MW, when the total installed capacity of the National Electricity Production System was around 12,000 MW.

Installed Electric Power Capacity (MW)															
RES technology	**1990**	**1991**	**1992**	**1993**	**1994**	**1995**	**1996**	**1997**	**1998**	**1999**	**2000**	**2001**	**2002**	**2003**	**2004**
Total	2411	2515	2541	2552	2552	2552	2551	2757	2896	3068	3299	3369	3388	3473	3593
Hydro	2408	2512	2523	2523	2523	2523	2522	2728	2856	2959	3072	3076	3078	3079	3095
of which, pumped storage	315	315	315	315	315	315	315	520	615	615	699	699	699	699	699
Hydro -1 MW*	2	2	2	2	3	3	3	4	5	8	14	15	17	19	23
Hydro 1-10 MW*	28	28	39	39	39	39	39	39	40	42	42	45	45	50	56
Hydro 10+MW*	2063	2167	2167	2167	2166	2166	2165	2165	2197	2294	2317	2317	2317	2311	2317
Geothermal Energy	2	2	2	2	2	2	2	2	2	0	0	0	0	0	0
PV	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1
Wind Energy	1	1	16	27	27	27	27	27	38	109	226	270	287	371	472
Biogas	0	0	0	0	0	0	0	0	0	0	1	22	22	22	25
** excluding pumped storage production*															

Table 1: Installed RES Electric Power Capacity

As shown on Table 1 and the Chart 1, a steady increase of the Wind parks, Small Hydros, and Biogas comes as a result of the financial support measures, especially by the Operational Programme for Energy and the Development Law.

Specifically, by the end of 2004 we had 472 MW with operational licenses, when in 1997 the PPC Wind Parks were only providing 27 MW. Also, the Small Hydros reached 80 MW in the end of 2004, when in 1997 PPC could provide 43 MW. Finally, the electric power production and cogeneration biogas units (mainly in Liosia and Psytalia) offer electric power of 25 MW.

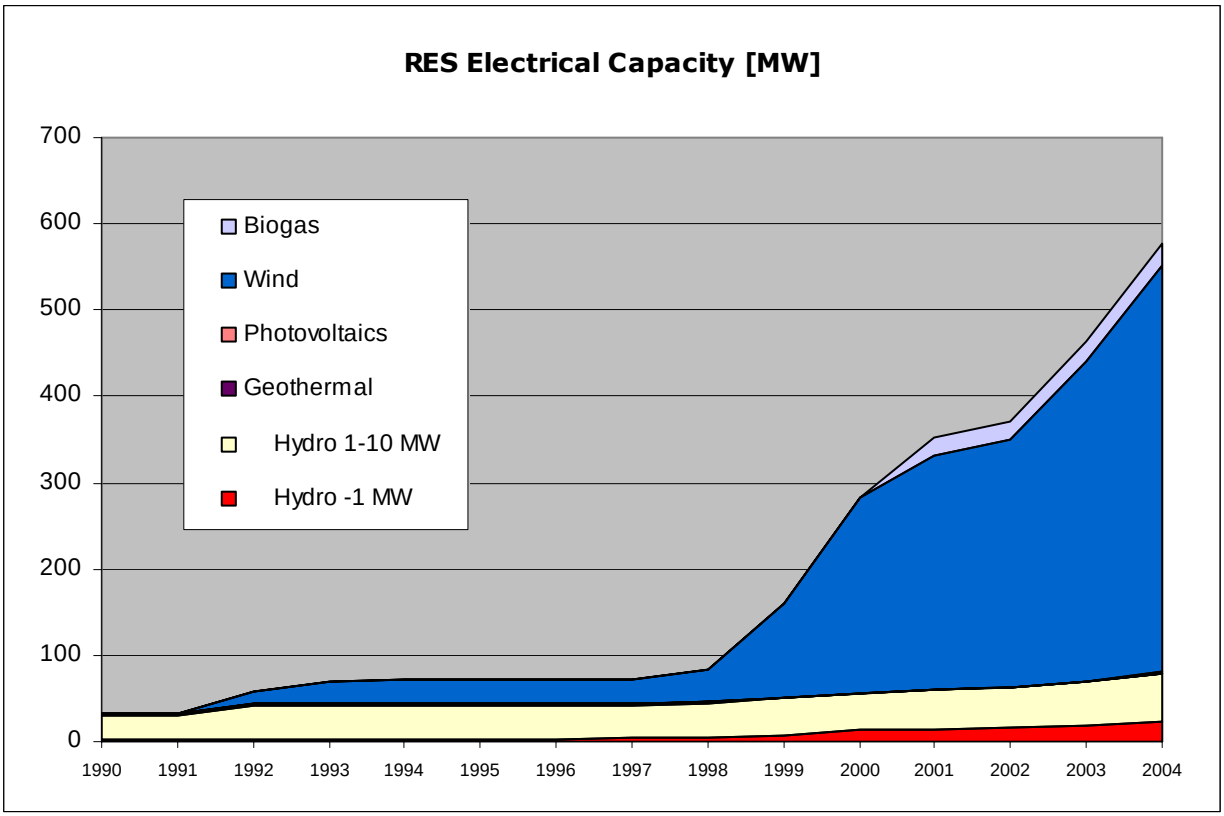


Chart 1: The development of installed capacity by RES without large hydros

In 2004, the electricity production from RES reached roughly 6,45 TWh and was derived by 81% from hydroelectric stations (5205 GWh), by 17% from wind parks (1121 GWh), 124 GWh (2%) came from biomass, while there was a very small production that originated from photovoltaic stations (Table 2).

Electric Power Production (GWh)															
RES Technology	**1990**	**1991**	**1992**	**1993**	**1994**	**1995**	**1996**	**1997**	**1998**	**1999**	**2000**	**2001**	**2002**	**2003**	**2004**
Total	1999	3173	2397	2588	2879	3816	4542	4132	3936	4992	4562	3560	4240	6459	6450
Hydros	1997	3171	2389	2541	2842	3782	4504	4096	3866	4829	4111	2725	3463	5332	5205
of which, pumped storage	228	72	186	259	243	253	156	214	149	237	418	628	663	566	533
Hydro -1 MW*	6	5	5	5	8	7	7	11	8	9	26	40	58	76	91
Hydro 1-10 MW*	54	71	43	77	97	89	119	138	138	160	140	95	92	169	212
Hydro 10+MW*	1709	3023	2155	2200	2495	3434	4222	3733	3572	4423	3527	1962	2650	4521	4369
Wind Energy	2	2	8	47	37	34	38	36	70	162	451	756	651	1021	1121
Biogas	0	0	0	0	0	0	0	0	0	1	0	79	126	105	123
PV	0.1	0.0	0.1	0.2	0.2	0.2	0.2	0.1	0.1	0.2	0.2	0.2	0.5	0.6	0,8
* excluding *pumped storage production*															

Table 2: Electricity Production from RES

The gross electricity consumption for the same year was 62 TWh. The development of electricity production from RES is shown on Chart 2.

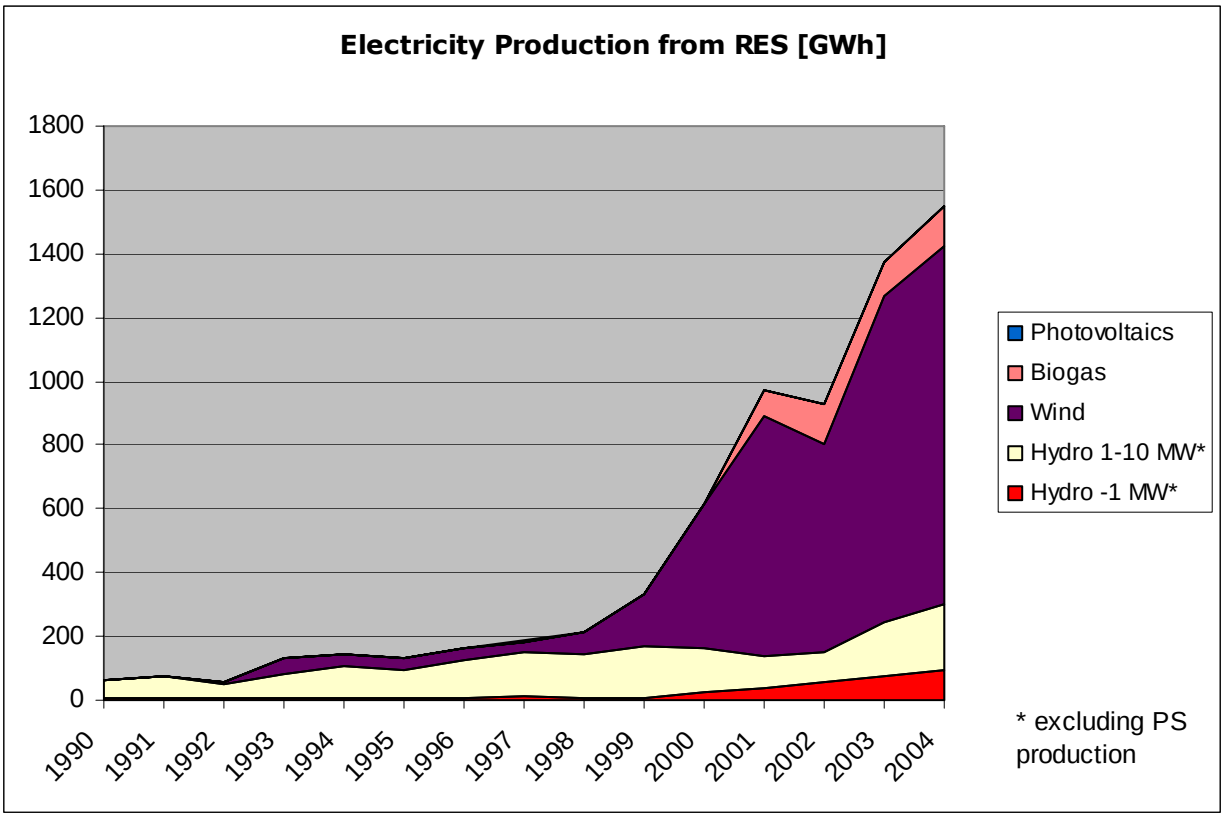


Chart 2: Electricity Production from RES not-including large Hydros

For the year 2004 the total primary heat generation was 44.434 TJ, coming by 86% from biomass, by 10% from solar energy and by 3,5% from biogas.

The primary energy production from RES (Table 3) for the same year was 1,6 Mtoe, while in the early '90s it was 1,2 Mtoe. Out of that, 700 ktoe came from the use of non-commercial biomass in households, 215 ktoe from the use of biomass in industry for own use (total biomass amount 57%), 448 ktoe (28%) from hydroelectric plants, 96 ktoe (6%) from wind energy, 108 ktoe (7%) from solar-thermal systems and finally, 36 ktoe (2%) from biogas, mainly for electricity generation. The development of the primary energy production from RES is shown on Chart 3.

PRIMARY ENERGY PRODUCTION FROM RES (ktoe)															
RES Technology	**1990**	**1991**	**1992**	**1993**	**1994**	**1995**	**1996**	**1997**	**1998**	**1999**	**2000**	**2001**	**2002**	**2003**	**2004**
Hydros	172	273	206	219	245	325	388	353	333	416	354	235	298	459	448
of which, pumped storage	20	6	16	22	21	22	13	18	13	20	36	54	57	49	46
Hydro -1 MW*	1	0	0	0	1	1	1	1	1	1	2	3	5	7	8
Hydro 1-10 MW*	5	6	4	7	8	8	10	12	12	14	12	8	8	15	18
Hydro 10+MW*	147	260	185	189	215	295	363	321	307	381	304	169	228	389	376
Biomass	893	897	899	899	894	897	908	911	907	911	945	938	948	910	917
in Domestic sector	702	702	702	702	702	702	702	702	702	702	702	702	702	702	702
in Industry etc.	191	195	196	197	191	195	206	209	205	209	243	236	246	207	215
Wind Energy	0	0	1	4	3	3	3	3	6	14	39	65	56	88	96
P/V	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Solar Energy	56	63	70	75	79	82	86	89	93	97	99	100	102	105	108
Biogas	0	0	1	1	1	1	1	1	1	1	1	33	48	36	36
Geothermal Energy**	3	3	3	3	4	3	3	2	3	2	2	2	1	1	1
Total	1125	1236	1178	1201	1225	1311	1388	1359	1342	1440	1439	1373	1453	1598	1606
Total excluding pump systems	1105	1230	1162	1178	1204	1290	1375	1340	1329	1420	1403	1319	1396	1550	1560
Total excluding Large Hydros, pumping and Biomass in household sector	256	268	274	287	287	292	309	317	320	337	397	448	466	458	482
* excluding *pumped storage*, ** data under evaluation															

Table 3: Primary production from RES, not-including large hydros & biomass in domestic sector

RES contribution in Energy Balance (ktoe)															
	1990	**1991**	**1992**	**1993**	**1994**	**1995**	**1996**	**1997**	**1998**	**1999**	**2000**	**2001**	**2002**	**2003**	**2004**
Primary RES production	1.125	1.236	1.178	1.201	1.225	1.311	1.388	1.359	1.342	1.440	1.439	1.373	1.453	1.598	1.606
RES production excluding large Hydros, pumped storage and Biomass in household sector	256	268	274	287	287	292	309	317	320	337	397	448	466	458	482
Gross domestic energy consumption	22181	22286	22840	22638	23405	23482	24161	25056	26385	26623	27821	28704	29025	30160	30494
RES contribution in gross domestic energy consumption	5.1%	5.5%	5.2%	5.3%	5.2%	5.6%	5.7%	5.4%	5.1%	5.4%	5.2%	4.8%	5.0%	5.2%	5,2%
RES total, excluding large Hydros, pumping and Biomass in Domestic sector	1.2%	1.2%	1.2%	1.3%	1.2%	1.2%	1.3%	1.3%	1.2%	1.3%	1.4%	1.6%	1.6%	1.5%	1.6%

Table 4: Development of RES contribution in gross domestic energy consumption

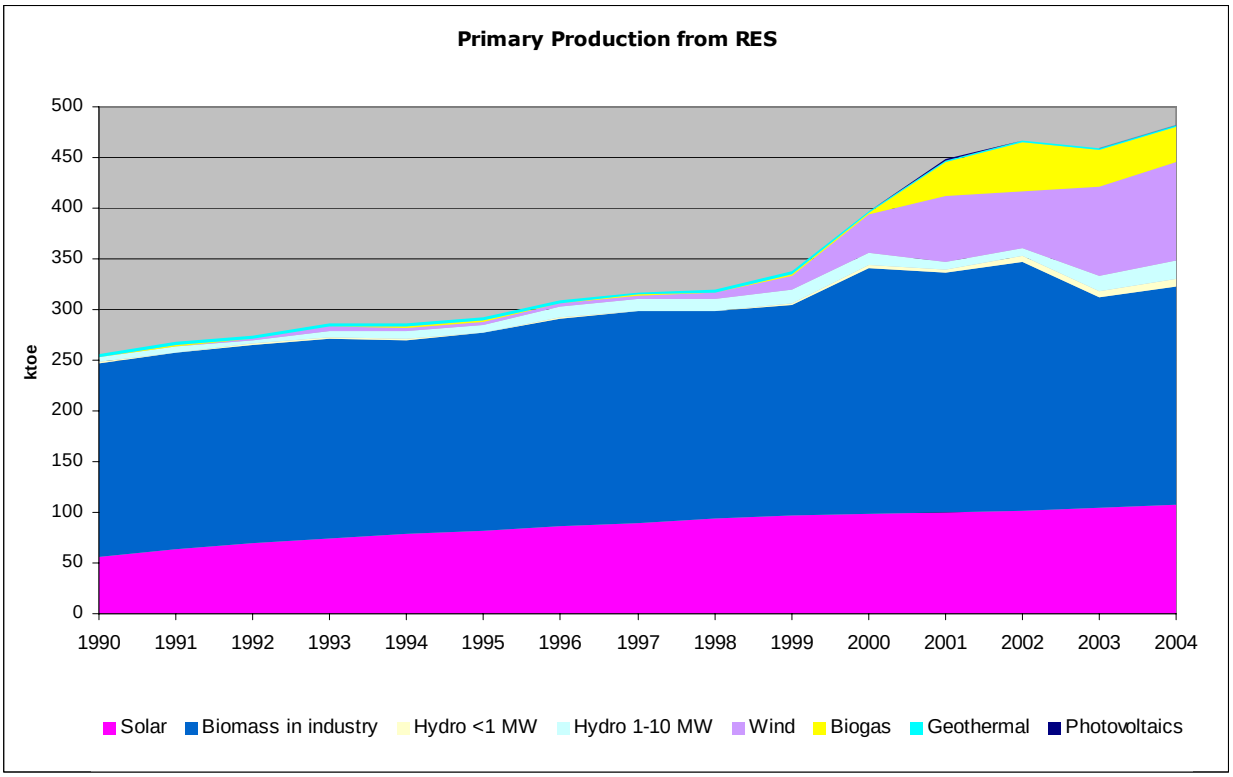


Chart 3: Primary production from RES, not-including large hydros & biomass in the domestic sector

The RES contribution in the gross domestic energy consumption is stable and ranges about 5-5,5% (Table 4). The reason for that is that the primary energy production from RES is by 70% attributed to non-commercial biomass and the large hydros which remain in stable levels and they are not influenced by the financial support policies. As shown on Chart 3, the overall RES contribution, excluding biomass in the household sector and the large hydros, presents a steady upwards trend thanks to the financial support measures. However, due to the energy demand increase and the resulting increase of the gross domestic consumption, this amount doesn't seem to change.

The statistic data of the last years also present the sharp variance of the amount of RES contribution in electricity production (5-10%), which is owed, mainly, to the way of operation of the large hydros by the PPC, while the remaining RES have a steadily increasing contribution that has reached 2,5% in the year 2004 (Table 5).

% RES contribution to electricity production (GWh)															
	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004
RES total	1999	3173	2397	2588	2879	3816	4542	4132	3936	4992	4562	3560	4240	6459	6450
Total excluding pumped storage	1771	3101	2211	2329	2636	3563	4386	3918	3787	4755	4144	2932	3577	5893	5917
Total excluding large hydros and pumped storage	62	78	57	130	141	130	164	185	216	332	617	970	927	1372	1548
Gross electric energy consumption	35714	36459	38016	39205	41006	42349	43917	45800	47939	49796	53832	56204	57504	60571	61630
RES contribution, excluding pumped storage hydros, to gross electric energy consumption	5.0%	8.5%	5.8%	5.9%	6.4%	8.4%	10.0%	8.6%	7.9%	9.5%	7.7%	5.2%	6.2%	9.7%	9.6%
RES contribution, excluding large hydros and pumped storage, to gross electric energy consumption	0.2%	0.2%	0.1%	0.3%	0.3%	0.3%	0.4%	0.4%	0.4%	0.7%	1.1%	1.7%	1.6%	2.3%	2.5%

Table 5: The development of RES contribution to gross electricity consumption

It must be noted that the 10% amount of the 2003-2004 period, isn't by any means a representative sample for the following reasons:

1. The large hydros in Greece are almost exclusively "dam-type" and they are used mainly for pick loads while their generation depends on the water availability in the reservoirs

2. The years 2003 and 2004 were particularly good years in terms of water-supply and during that period the use of the Large Hydros was extensive

1.4. ECONOMIC DEVELOPMENT AND ENERGY CONSUMPTION

%/year	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	1990-1995	1995-2004
GNP	2.1%	2.4%	3.6%	3.4%	3.4%	4.5%	4.6%	3.8%	4.6%	4.7%	1.25%	3.9%
Value Added in Industry	-	2.9%	-1.7%	7.3%	1.2%	5.4%	7.4%	2.1%	6.1%	0.9%	-	3.5%

Table 6: Economic and Industrial Development in Greece

All long-term indices for Greece demonstrate a remarkable improvement as of 1995. For the 1990-1995 period, the GNP growth rate was on average 1.3%, while for the 1995-2004 period it was 4%.

The GNP growth rate was over 4.5% during the 2003-2004 period. The industrial sector in particular shows an upwards trend, mainly due to the modernization it has undergone over the last years. The mean annual growth of Value Added in industry was 3.5% for the 1995-2004 period.

The final energy consumption in Greece remained stable for the 1990-1994 period with a consumption of around 15 Mtoe, excluding the non-energy uses. Between the years 1995 and 1996 the final energy consumption increased by approximately 6.5% while since then, the mean annual growth rate increased by 39% during the 1990-2004 period, mainly due to the fast economic growth.

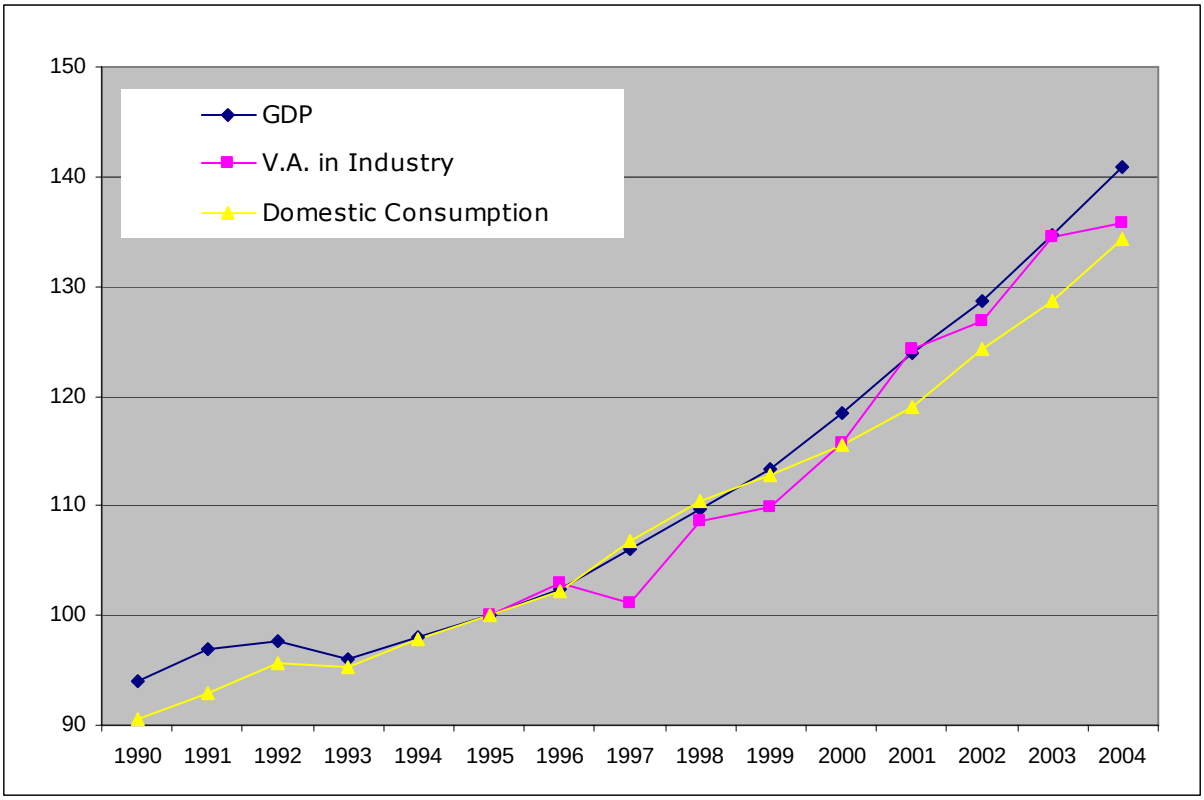


Chart 4: Development of the Basic Microeconomic Indices in Greece

The share of electricity in the final consumption has increased from 15% in 1990 to 21% in 2004. On the contrary, the share of the petroleum products has been falling in the last few years due to the introduction of natural gas. The main characteristic of the final energy consumption is the increase of consumption in the transport sector, the tertiary sector, the

household sector and in industry. Two basic indices are used in order to determine the overall energy intensity of country: the intensity of the primary energy and intensity of the final energy. The energy intensity in Greece showed an upwards tendency for the 1990-1998 period and ever since, it has been declining slightly.

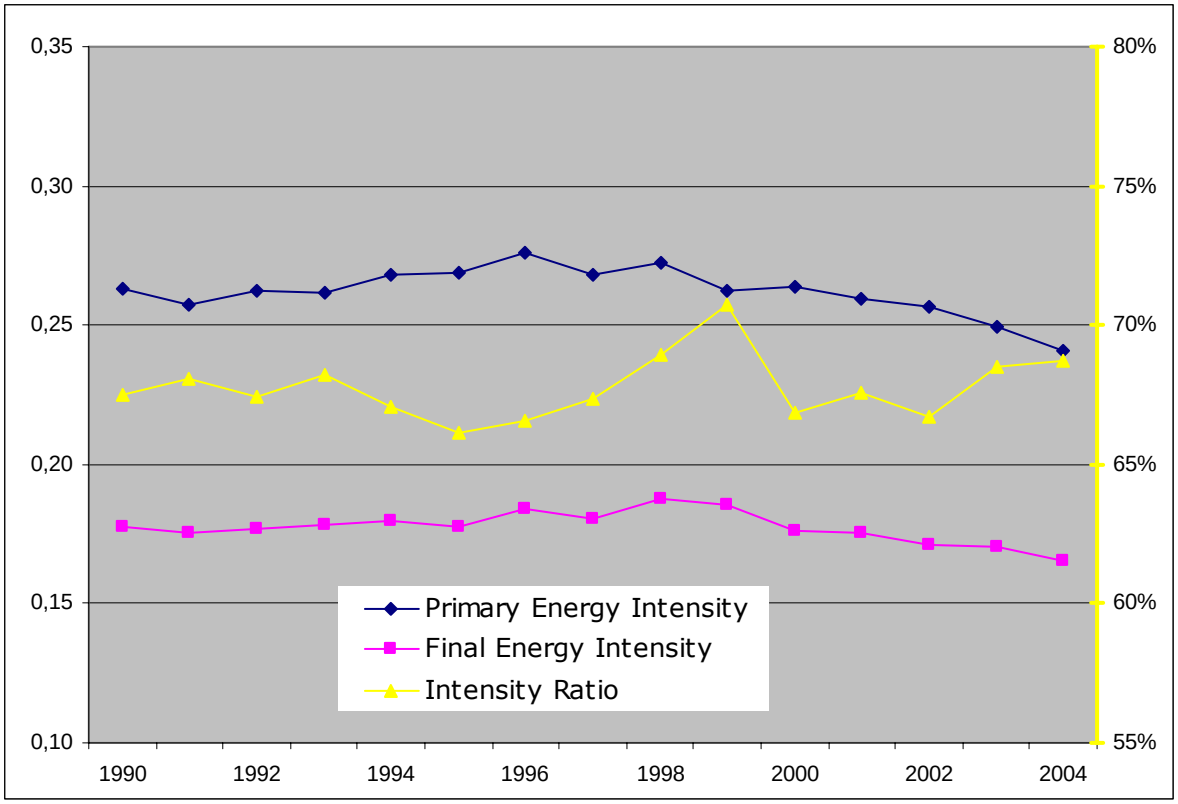


Chart 5: Development of the primary and final energy intensity

1.5. BASIC INDICES OF ENERGY INTENSITY

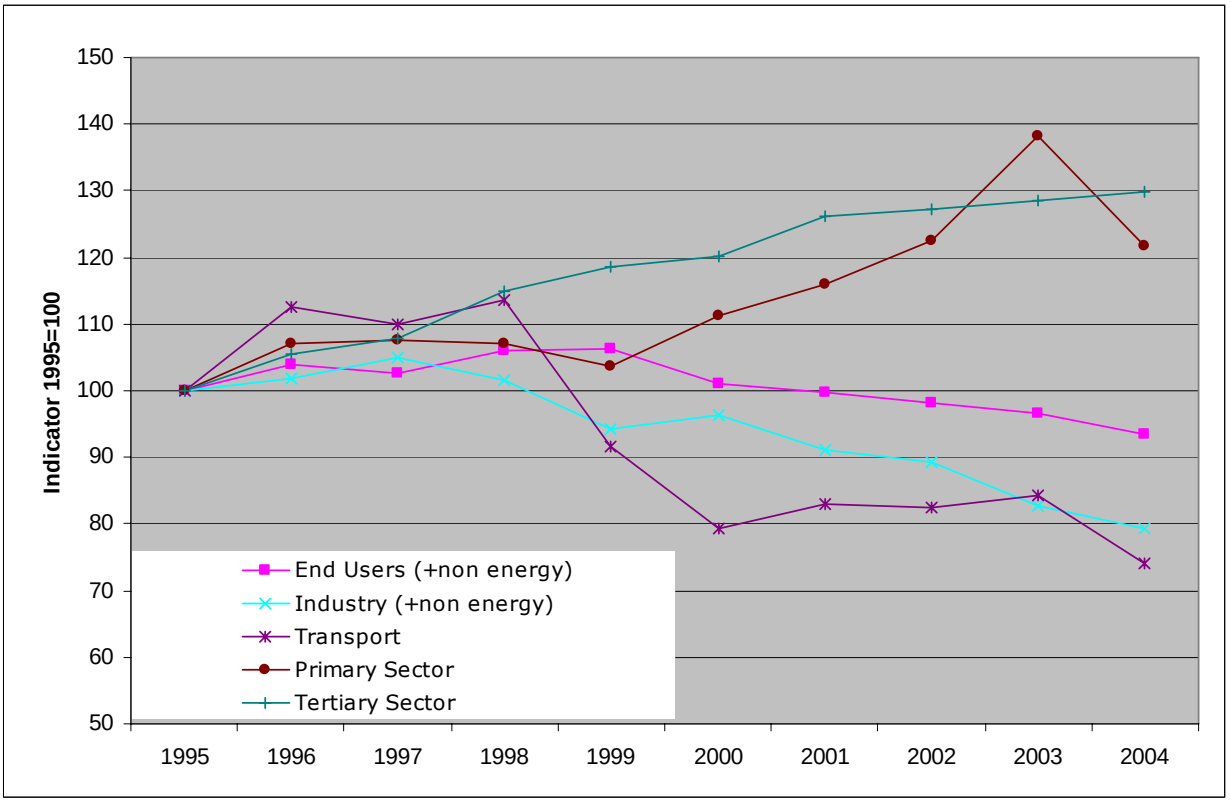


Chart 6: Energy Intensity in demand sectors

Chart 6 presents the basic energy intensity indices by economic sector activity. The energy intensity increase is evident in the households which consume more due to the economic growth, mainly owed to the widespread use of air-conditioners and household appliances.

The energy intensity in industry has decreased, due to the modernization of the sector. Furthermore, energy intensity is decreasing in the transport sector as well, due to higher car ownership and the modernization of public transportation.

Charts 7 and 8 indicate the development of energy intensity in both energy-intensive and non energy-intensive industries. The overall energy intensity in industry shows a small, yet steady decrease.

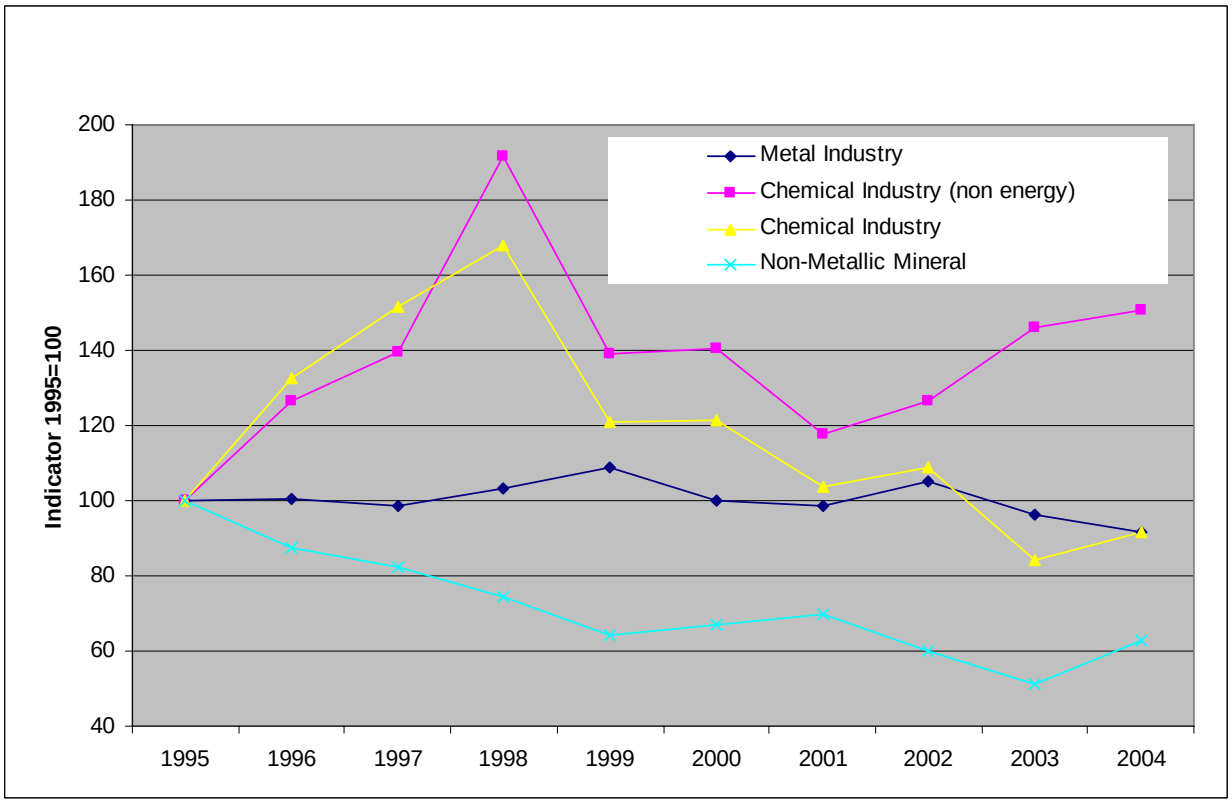


Chart 7 : Energy Intensity in energy-intensive industrial sectors

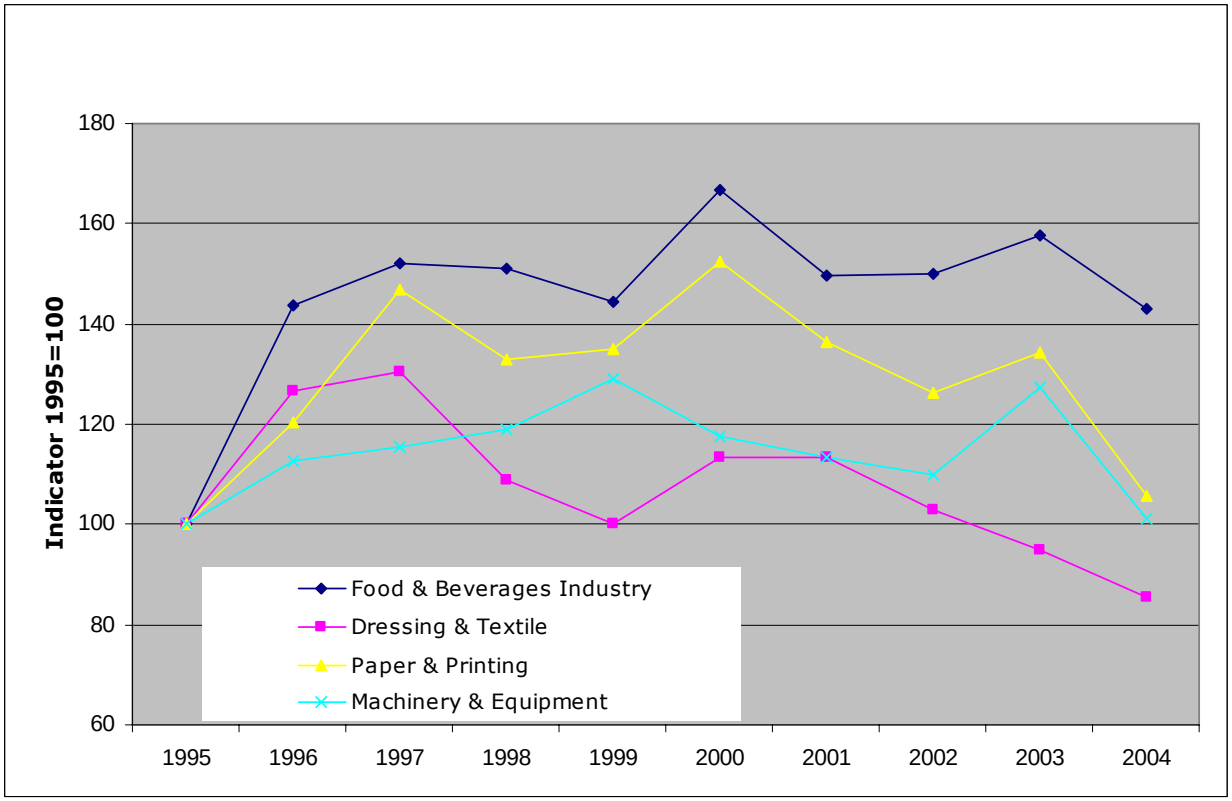


Chart 8: Energy Intensity in non energy-intensive industrial sectors

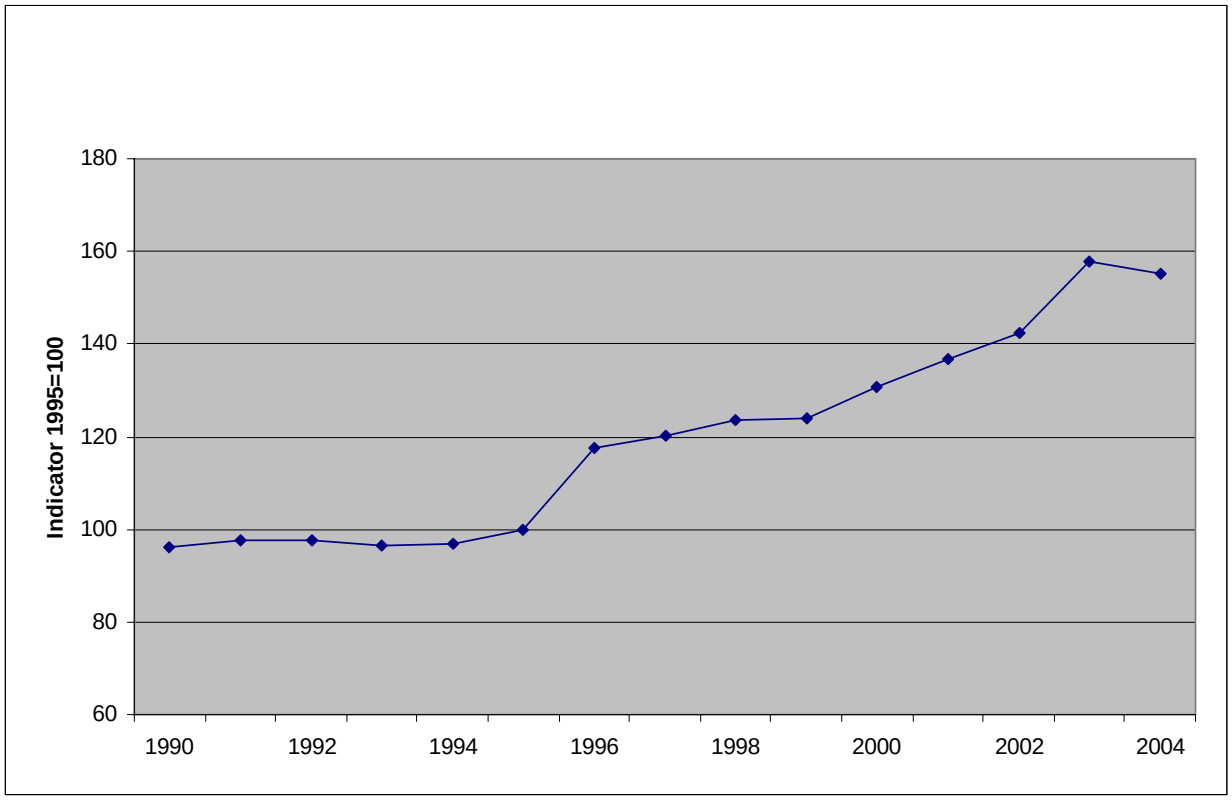


Chart 9: Per capital consumption in the household sector

Finally, the tertiary sector energy indices show an increasing trend, as indicated in Chart 9, due to the remarkable growth and the structural changes in the sector.

1.6. THE STRATEGIC ROLE OF CRESS IN THE LATEST DEVELOPMENTS

Over the nineteen years of its operation, CRES has been recognised in two main fields of action:

- as a **National Energy Centre,** that apart from dealing with energy planning issues on RES and RUE/ES always in accordance with the policy of the Ministry of Development, it also develops the necessary infrastructure for the implementation of the policy of the Ministry, as well as of the investment programmes on RES and RUE/ES.

- as a **Research and Technological Centre for RES, RUE and ES**, by promoting applied research and technological development, by developing research and demonstration infrastructures and exploiting the research results stemming out of these aforementioned activities for supporting the RES and RUE/ES market with specialized products and services.

In the framework of its mission, CRES:

- studies and analyzes national, regional and sectorial issues of energy policy and planning, makes suggestions and provides advices on the institutional, organizational and financial frameworks for the implementation of the national programmes on RES and RUE/ES
- contributes to the promotion of actions in the context of its international environmental commitments related to energy production and consumption
- organizes, supervises and implements demonstrative and pilot programmes with a view to lifting all barriers (technical and non-technical ones) for the promotion of the RES and RUE/ES policies
- carries out applied research and develops new viable and environmentally friendly technologies
- exploits the research results by providing expert/accredited measuring services and testing both for the Greek and the European industries
- promotes its research-technological infrastructure for targeting at the evaluation/accreditation of the RES/RUE and Energy Saving technologies
- provides technical services and support in the form of expert know-how and information to third parties by implementing RES and RUE/ES applications in projects of the private sector, the Local Government, unions etc.
- implements technology-transfer actions in the fields of its expertise and provides information and support for all those interested, investors, authorities etc.
- organizes and participates in a number of events, such as, technical and scientific conferences, accredited field programmes, meetings etc.

CRES, given its statute and remarkable know-how acquired in new energy technologies, has played an important role in the latest developments. CRES participates in the eleven-member Board of Directors of the National Council for Energy Strategy, which constitutes the advisory body of the Ministry of Development for issues pertaining to the long-term planning of the national energy policy. CRES has also participated in the meetings of the

Directors of the Research Centres that are under the auspices of the General Directorate of Research and Technology of the Ministry of Development.

CRES had a crucial presence in the Greek Parliament during its participation in the debate of the Permanent Committee of Production and Trade of the Parliament, concerning the draft law on "Introduction of biofuels and other renewable sources into the Greek market", as well as in the discussion of the Parliamentary Committee for the Environment on the draft law for "Waste Management".

Among other, CRES constitutes the main body for the implementation of the National Investment Programmes on RES and RUE/ES, thus contributing substantially in the evaluation of investment proposals, technical monitoring of projects, providing information to investors and in the decision-making for policy design and investment planning on RES and RUE/ES.

Outside Greece, both in Europe as well as on an international level, CRES is a pioneer of applied research on new energy technologies and the provision of specialized services to the European industry, including matters of analysis, planning and implementation of energy investments.

CRES' remarkable presence in the international scene has been epitomised by the undertaking of the presidency of the European Energy Network - EnR, as well as of the Mediterranean Energy Network -MEDENER. For the 2005-2006 period CRES has also undertaken the vice-presidency of the European Academy for Wind Energy (EAWE) and for the International Network of Organizations that implement accredited measurements in the wind energy sector, MEASNET.

CRES participates in important working-groups and European Commission networks (i.e.: ERA-Nets for Hydrogen and PV systems), also in significant decision-making groups of the European Research Area (energy committee for the 6th and 7th Framework Programmes, technology platforms etc.), in the International Organization for Energy (i.e.: ETSAP) and in various European and International Accreditation Organizations (IEC, CEN-CENELEC).

CRES is a scientific/technological establishment of international prestige, competent and qualified to offer valuable services for the planning and implementation of both national and European policies.

CRES long standing experience and participation in more than 600 European, international and national competitive projects has ensured the quality of the services it offers, as does a number of private contracts encompassing several energy-policy and energy-planning analysis studies, energy information systems and models, investments and economic viability studies, applied research and development projects, demonstration projects and expert services in businesses and in industries in Greece and abroad.

Parallel to these, CRES has carried-out environmental-impact studies, market research, educational programmes and various other activities for the penetration and wider acceptance of RES and RUE/ES.

2. CRES ACTIVITIES IN 2005

The main strategic aims of CRES are as follows:

- the support of the national and European energy policy
- the development and promotion of RES, RUE and Energy Saving applications
- the strengthen and develop the domestic RES industry
- the support of the mature RES/RUE/Energy-Saving markets through high quality products and services, as a crucial means for their sustainable development.
- the financial self-reliance and viability of the Centre

In addition, other long-term aims of CRES include:

- the earning of Scientific and Technological Excellency
- the reinforcement and modernization of its infrastructure
- the strengthening and expansion of its presence in the International Energy Market, apart from the Greek and the European one
- the reinforcement of its role in energy policy and energy planning issues in respect to its fields of competence

The more precise targets set for 2005 in the fields in which CRES specializes are presented here after, as well as, the ways with which these targets were implemented.

The analytical description of all the projects that were carried-out during 2005 is shown in **Annex 1**. More than that, CRES has participated a large number of scientific conferences (through the presentation of articles, works and /or studies), the overall list of which is included in **Annex 2**.

2.1. ENERGY POLICY SUPPORT AND INVESTMENT PROGRAMME MANAGEMENT IN THE FIELDS OF RES AND RUE/ES

The targets/actions in 2005 were the following:

1. Contribution to the investment programme planning and provision of the necessary technical support for its implementation (participation in Thematic Intermediate Agent, OPC, investments evaluation for the RAE etc.).
2. Contribution to the improvement of the legal framework for the promotion of RES through a study for RAE in respect to the improvement of the licensing process for RES related projects and their land-planning.
3. Energy and Environmental management implementation in industry and ES application in public buildings (Operational Programme for Competitiveness (OPC) - Action 2.1.1: Energy inspection in selected public sector buildings). In the context of these actions, the creation and set-up of an environmental and energy management centre in the Thessaloniki industrial zone is also included.
4. Fulfilling the requirements for legal and technical support in the context of the Community Directive on "Energy Performance in Buildings".

CRES has participated in a series of projects in this field and they can be divided as follows:

1. National projects: Implementation of the planned actions through management of the Thematic Intermediate Agent, of the OPC investments in one national project in that framework, where CRES is the subcontractor in projects that the Ministry of Development is the final beneficiary.
2. European and other competitive projects: Participation in twelve, mainly E.U. financed projects, in the framework of SAVE and ALTENER of the DG for Energy and Transport, as well as coordination of a LIFE project for Emission Trading, and the supportive mechanisms for RES, of the DG for the Environment in Greece.
3. Third-party services: contract dedications, study elaborations and/or technical support for other authorities (i.e.: RAE).

2.2. ENERGY PLANNING SUPPORT AND RES, RUE, ENERGY-SAVING TECHNOLOGIES PROMOTION

The targets set for this field for the year 2005 were as follows:

1. Expansion of the support infrastructure for decision-making on Energy Planning for the part of the Ministry of Development (National Energy Information System, Energy Models Laboratory, calculation of economic potential for RES, RUE and Energy-Saving, etc.). Ensuring the modernization of these mechanisms through funding from the 3rd Community Support Framework.
2. Support of the European and national policies for the promotion of RES, RUE and Energy-Saving through participation in European competitive programmes, cooperation with similar energy centres of other E.U. member-states. Involvement in E.U. Commission networks and the national energy centres of other member-states.
3. Expansion and consolidation of the cooperation with Central and East European countries, as well as with Mediterranean countries, aiming at planning and implementing supportive actions, in the context of energy investment programmes.

During 2005, CRES participated in a number of projects, either as the main subcontractor, or as a partner, which could be categorised as follows:

1. National projects: implementation of the planned action in twelve large national projects in the framework of the Operational Programmes "Information Society" and "Competitiveness", where CRES is the final beneficiary and/or subcontractor, where the final beneficiary is the Ministry of Development.
2. European and other competitive programmes: participation in nineteen projects, mainly financed by the SAVE and ALTENER Programmes of DG for Energy and Transport and the 6th Programme Framework of the DG for Research.

For the support of the European and national Energy Policy in the fields of RES, RUE and ES, but a well as for the broadest possible dissemination of "new and environmentally friendly technologies" of RES, RUE and ES, both at domestic and international level, CRES developed a multifaceted activity in 2005. This concerns a series of workshops and/or technical meetings for the dissemination of the results of the various projects in which CRES participates and also involves the participation of the Centre in a number of exhibitions relevant to its fields of competence.

At this point, it is important to stress that every year CRES opens its doors to visitors from Greek schools. More than 2.000 pupils (from all educational tiers) and students visited the Centre facilities at Pikermi, as well as the Demonstration Wind Park at Keratea, in the year 2005.

In the context of international cooperation, CRES had undertaken, until May 2005, the rotating presidency of the MEDENER network and participated actively in the following working-groups of the European Energy Network (EnR):

- Energy Efficiency Working Group (EEWG) in which CRES was presiding

- Renewable Energies Working Group
- Energy Audits Working Group
- Working Group on Transport
- Working Group on CEECs Central and Eastern Europe
- Working Group on Monitoring Tools
- Working Group on Labeling
- Energy Related Behaviour Working Group

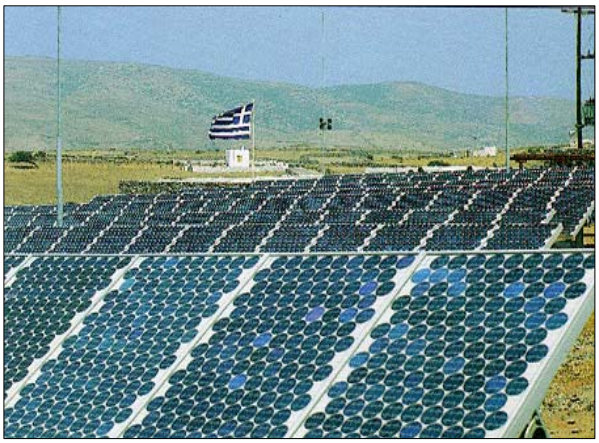
2.3. RES RESEARCH AND TECHNOLOGICAL DEVELOPMENT

CRES is active in the following technologies:

- Wind Energy
- Biofuels
- Geothermal Energy
- Active Solar systems
- Passive Solar systems and building cell materials
- PV systems and distributed generation
- Water technology
- Hydrogen Technology combined with RES.

For 2005 the set targets, regarding applied research in RES technologies were the following:

1. Research and technology promotion and development in the various thematic RES fields as well as continuous growth and upgrading of the Centre know-how, aiming at earning and sustaining excellence on an international level and the development of new technology products and services.
2. Incorporating research and technological development in the field of RES and in the energy systems. Demonstration of pilot applications in those fields with emphasis on their greatest filtration possible penetration in the energy system (hybrid systems, energy storage, RES and Hydrogen technologies combinations).
3. Development and evolution of CRES laboratory infrastructure, as well as of the products of the RES accreditation system.



4. The development of complete methodologies - software for evaluating the physical potential of RES, including experimental and theoretical methods and processes for the assessment of the operational applications of RES, adjusted to the peculiarities of Greece.
5. The exploitation of the research results and support of the RES market, through the development and provision of high-quality specialised services.
6. The implementation and operation of a hydrogen production pilot-unit powered by wind energy, in the CRES demonstration park in the year 2005.

CRES participation in a large number of projects in the same year, has contributed to the development of technological innovation and the broadening of its scientific expertise. These projects are as follows:

1. National projects: In the year 2005, CRES carried out planned actions in the context of 10 important research projects. These projects were in the framework of the special measures of the Ministry of Development concerning Research and Technological Development, in which GSRT is the final beneficiary.
2. Projects in the context of European competitive programmes: CRES participated in 39 E.U. financed projects, mainly in the context of the 5th and 6th Programme Framework of DG for Research, but also in ALTENER of DG for Energy and Transport.
3. Services to third-parties: these include a large number of private contracts with Greek and European industries, as well as private and public authorities (both in Greece and abroad), concerning mainly high-quality specialised services (wind energy potential measurements, wind turbine power curve measurements, accredited wind turbine load measurements, anemometer calibration, water power measurements), financial-technical studies for RES exploitation, investment evaluation studies (due diligence) for Greek and foreign Banks etc.
4. Infrastructure Reinforcement

- **Biomass-Hydrogen Laboratory**

In the framework of the OPC/Measure 4.5.1, CRES is currently expanding its biomass sector with a biomass gasifier laboratory and the expansion of the RES hybrid system tab through hydrogen production, storage and usage technologies on a laboratory level.

- **Electrolytic Hydrogen at CRES Wind Park**

In the context of the E.U. RES2H2 research project, CRES, in collaboration with other partners from Greece and abroad, developed a hydrogen production unit powered by wind energy in the Centre's wind park in Keratea, outside Athens. The unit is comprised of an electrolytic unit of 5m^3 of hydrogen per hour, metal hydride storage tanks, hydrogen compressor and a series of storage facilities. The unit went operational in 2005.

- **Energy Awareness Park (PENA)**

In the context of the Measure 2.1, Action 2.1.1 and responding to an invitation by the Special Management Agency of the OPC, CRES has undertaken the implementation of the project "Modulation of the Energy Awareness Park" of total budget 2.273.298,91 €.

The project concerns the development of the Energy Awareness Park for informing, mainly young people, on RES issues and environmentally friendly technologies. The park is being developed on the land of CRES' Wind Park in the "Vrahos Stavraetou" area of Keratea municipality.

For the success of the demonstrative purpose of the project, apart from RES technology display equipment (screens, posters, etc.), the park also includes small pilot units/applications for the better understanding of the technologies involved, such as demonstrative units for hydrogen, biomass, solar cooling, desalination through RES etc. The park will be illuminated with PV lighting. Two electric cars will be available for handicapped persons and the transportation of the equipment.

- **Proposal in the framework of «AKMON» Programme**

In the framework of the AKMON Programme, Measure 4.2, Action 4.2.2 of OPC, a proposal was submitted for the infrastructure development and support of the laboratories. The laboratories taking part in this effort were those of Wind Energy, Biomass, Small Hydro and Geothermal Energy. The programnme provides for the procurement of equipment in order to upgrade the existing laboratories and the procurement of basic equipment for the creation of new ones, such as the Geothermal energy laboratory. The project budget, especially regarding Wind energy, is based on private contracts and totals 1.285.125€.

Beyond the day to day research activities, CRES scientific staff participates in international organizations and networks in order to exchange information and disseminate the gained knowledge and the research results on an international level, as well as to identify the technical and other barriers and deal with them as groups.

There's also a noteworthy participation in scientific committees responsible for standards and RES technology accreditations.

Given the above, in 2005, CRES participated actively in the following:

- the European **Technical Committee CEN/TC312-Thermal solar systems and components,** in which it has undertaken the secretariat task
- the **Technical Committee TC-88 της IEC** (International Electro-technical Commission), which develops prototypes for wind turbines;
- the **International Organizations Network,** that carry-out certified measurements in the field of wind energy MEASNET, of which, CRES constituted one of the founding members for the 2005-2006 period and holds the vice-presidency of the Members Council;
- the **MEASNET network of European laboratories** (of which, CRES holds the vice-presidency of the Members Council);
- the **European Academy of Wind Energy**, of which, CRES is one of the founding members for the 2005-2006 period holds its vice presidency;
- the Agreement on Research and Development on Wind Energy matters of the International Organization for Energy (**IEA, WIND Implementing Agreement**)
- the **Pyne** and **Gasnet** networks in which, organizations across Europe are active participants on pyrolysis and biomass gasification matters;
- the European networks **PV-ERA-Net** and **Hydrogen ERA-Net (Hy-Co)** with main target the coordination of national and European efforts in the relevant sectors under a common research agenda;
- the **Technical Committee ΕΛΟΤ/ΤΕ35 –Solar Energy,** where CRES is the technical manager.

In the past year CRES continued to represent the Ministry of Development in the OECD International Organization for Energy "**Hydrogen Coordination Group"** and its staff participated in the R&D definition that has to be implemented in Europe in the hydrogen production field in the context of the EU Technology Platform for Hydrogen. The coordination of the initiative for the creation of a "Greek Hydrogen Island" in Milos, remained one of the most important activities of the Centre for 2005.

2.4. RESEARCH AND TECHNOLOGICAL DEVELOPMENT ON ENERGY SAVING

CRES' targets regarding Energy Saving for 2005 were as follows:

1. The promotion of Energy Saving applications in specific sectors of energy demand in Greek energy market (businesses, buildings, tertiary sector, hotels, investors, etc.), with the provision of technical support via technical and economic feasibility studies, energy monitoring and the implementation of energy measurements, energy planning of buildings, as well as technical support for the creation of new energy efficient products.
2. CRES is managing the project of the Thematic Intermediate Agent of the OPC for the Wind investment projects. In parallel, it'll support all the other intermediate partners (Development Association of Managing European Programmes for Thessaly and Sterea Hellas, Administrative Body for W. Greece – Peloponnesus – Epirus & Ioanian islands) in the technical follow-up and reception of their projects.
3. The demonstration projects on RUE/ES, Passive Solar and other Systems, for application on the buildings sector and the urban environment in general.
4. The market development and the support of the production sector of construction materials through the Building Cell and Indoor Climate laboratory.
5. The RUE/ES applications assessment, through the evaluation of the Operational Programme for Energy (OPE) projects (energy, economic benefits by technology and application sector).
6. The Energy Saving possibilities in transport, through the development and promotion of alternative means of public transport.
7. The Energy Saving directives compilation and their dissemination on CRES website.

The participation of CRES in a large number of projects in 2005 has contributed to the development of technological innovation and the expansion of its scientific experience. These projects are as follows:

1. Projects in the framework of competitive programmes: CRES participated in nine EU-financed projects, mainly in the context of the SAVE programme of DG for Energy and Transport, but also in the LIFE programme.
2. Provision of services to third-parties: These include 17 private contracts with private companies and/or public authorities in Greece concerning the provision of specialized high quality services such as energy studies of buildings and other installations, energy monitoring etc.

In addition, in 2005, CRES actively participated the PASLINK EEIG network, which is active in issues related to the measurements of the performance of construction materials and systems, as well as other technologies of the buildings sector. In fact, CRES was granted the coordination and management of PASLINK EEIG network for the year 2006.

2.5. OTHER FIELDS OF ACTIONS

2.5.1. QUALITY ASSURANCE

The main accomplishments of CRES **Quality Assurance Office** for the year 2005 are the following:

- the successful supervision of the Accreditation Certificate No 842 / 02.35.06 according to EN ISO 9001: 2000 to 2006-05-19 of the Thematic Intermediate Agent OPC of the 3rd Community Support Framework (CSF) by ELOT;
- the successful supervision of the DAR/DAP-PL-3266.00 Accreditation Certificate according to DIN EN ISO/IEC 17025: 2000 of the Wind turbine testing laboratory by the German Assurance Agent DAP;
- the successful supervision of the Accreditation Certificate 88/10.2003 till 2006-07-2 according to ELOT EN ISO/IEC 17025: 2000 of the Technology Evaluation Laboratory for RES and Energy Saving by the Greek Accreditation Forum;
- the successful supervision of the Accreditation Certificate No 100/24.07.2003 till 2006-07-24 according to ELOT EN ISO/IEC 17025: 2000 of the Energy Measurements of Building Materials by the Greek Accreditation Authority;
- the successful development of the Quality System and earning of the Accreditation Certificate according to ELOT EN 45011 as a body of the Verification of Greenhouse Gas Emissions according to the Directive 2003/87/EK by the Greek Accreditation Authority;
- the development of partial procedures of the quality management for the entire Organisation;
- the monitoring – supervision of the maintenance of the quality assurance procedures through extensive Inspections;
- the provision of advisory services related to the Quality Assurance to persons, services, departments, directorates and the central administration of CRES;
- the vocational training of CRES' staff responsible for matters pertaining to the competence of the Quality Assurance Office.

2.5.2. FINANCIAL SERVICES AND MANAGEMENT

The main accomplishments of CRES Financial Services and Management Directorate for 2005 were:

- the commencement of the operation of the expanded Electronic Data Processing System of Project managment and its exploitation for the procurement and travel services;
- the computerisation of the salary system through the automatic credit to the bank accounts of the staff members;
- the new management , transfer and storing process for consumables.

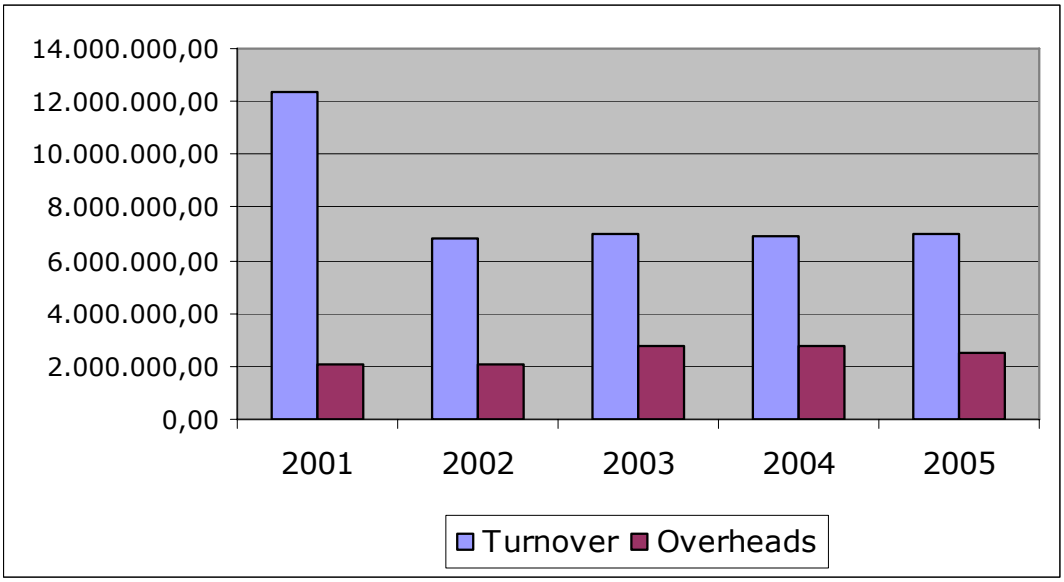


Chart 10: Annual turnover development to overheads of 5-years period

- the updating and completion of CRES regulations
- the administrative support by the Technical Services DPT, on issues pertaining to CRES land at Legrena (against claimants, legal affairs, guard, strategic investor seeking process)
- the support by the Technical Services on the planning and creation of infrastructure works at Energy Awareness Park in the context of the 3rd CSF.
- the support to the Thematic Intermediate Agent in the context of the OPC of 3rd Community Support Framework (CSF)
- support by the Technical Services DPTto the RES Directorate's completion and maintenance of CRES' wind park installations at Keratea.

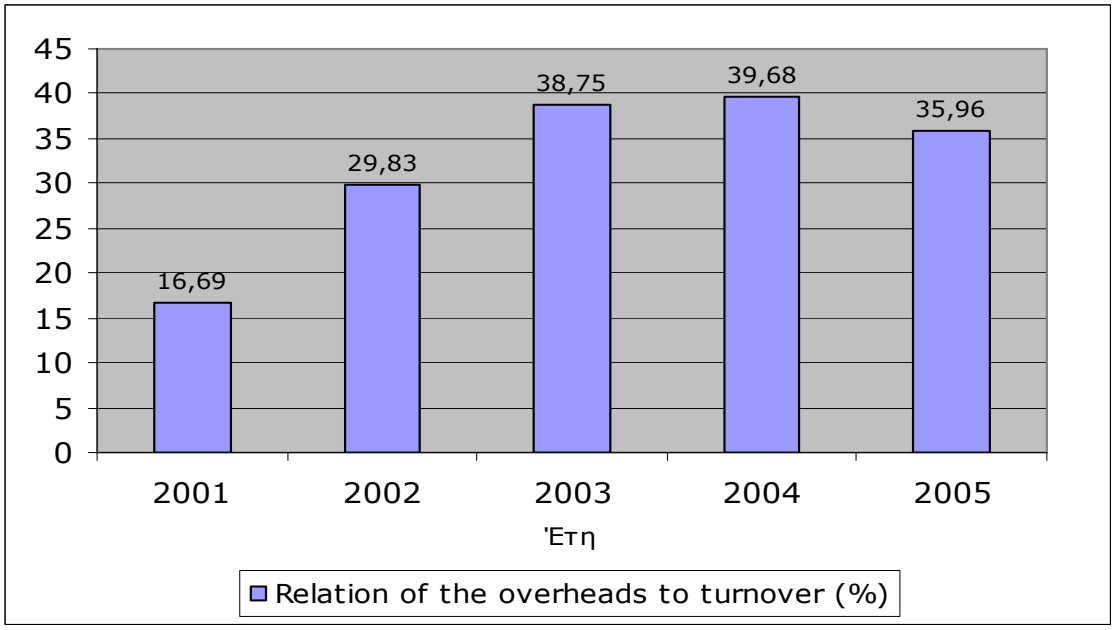


Chart 11: Relation of the overheads to turnover

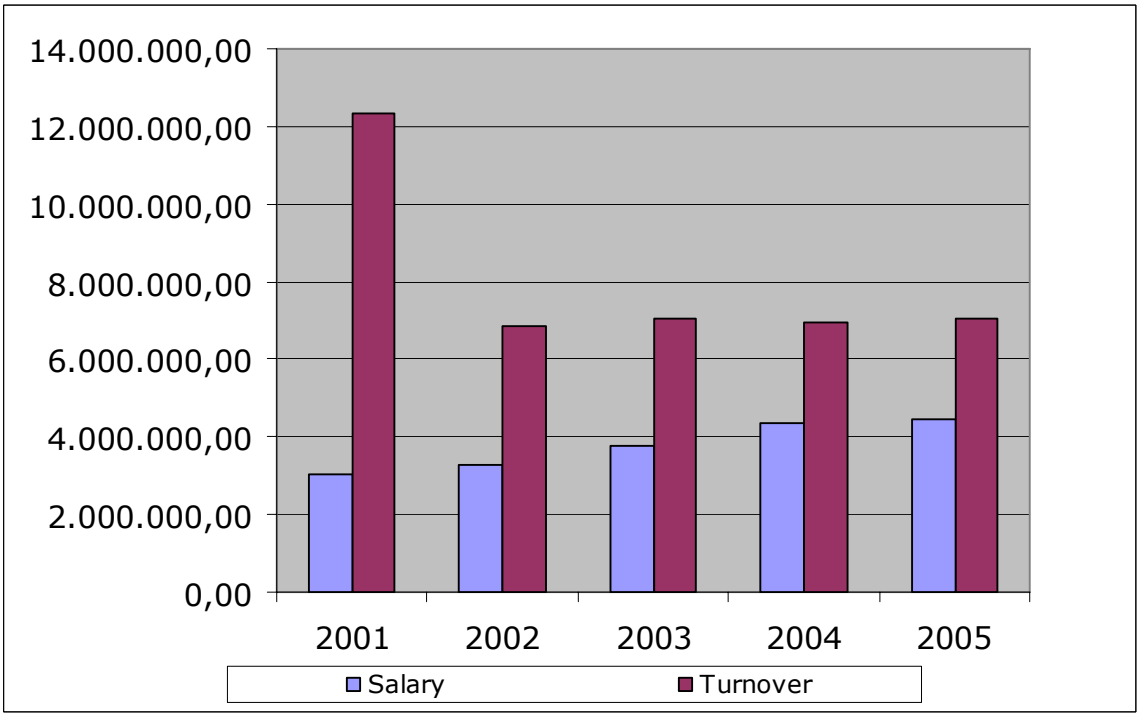


Chart 12: Development of salary payment to turnover

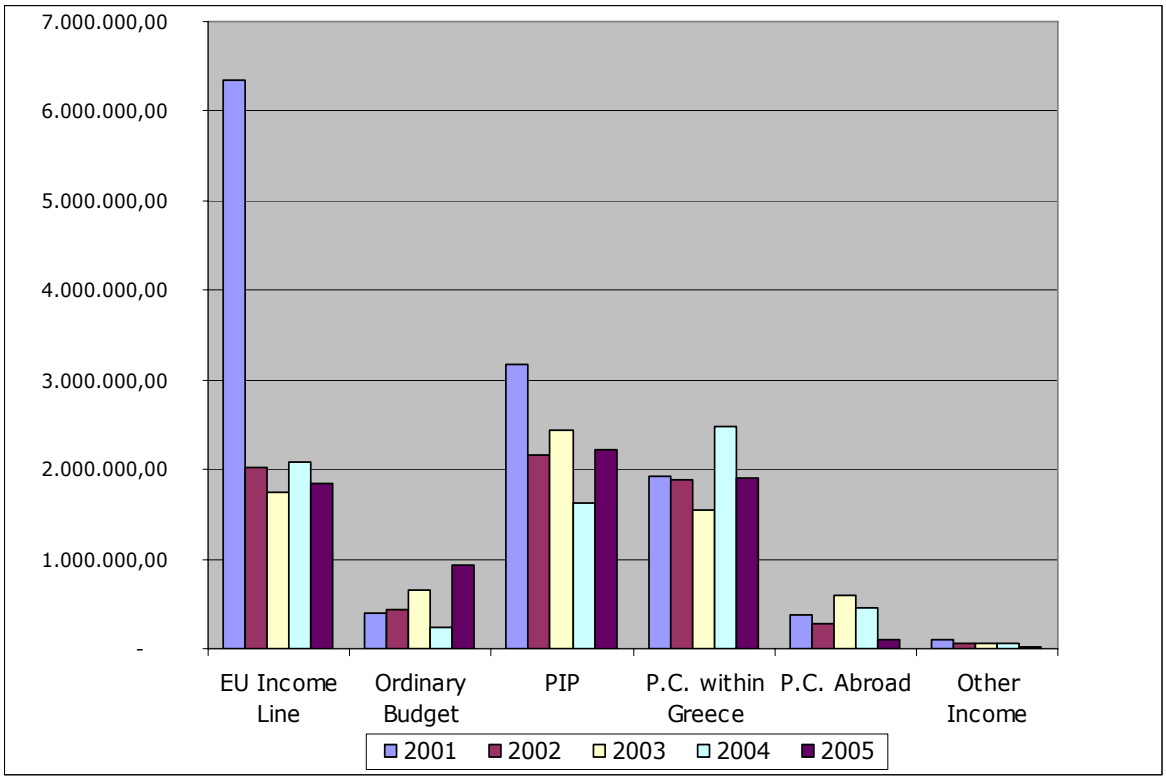


Chart 13: Revenue distribution according to project type

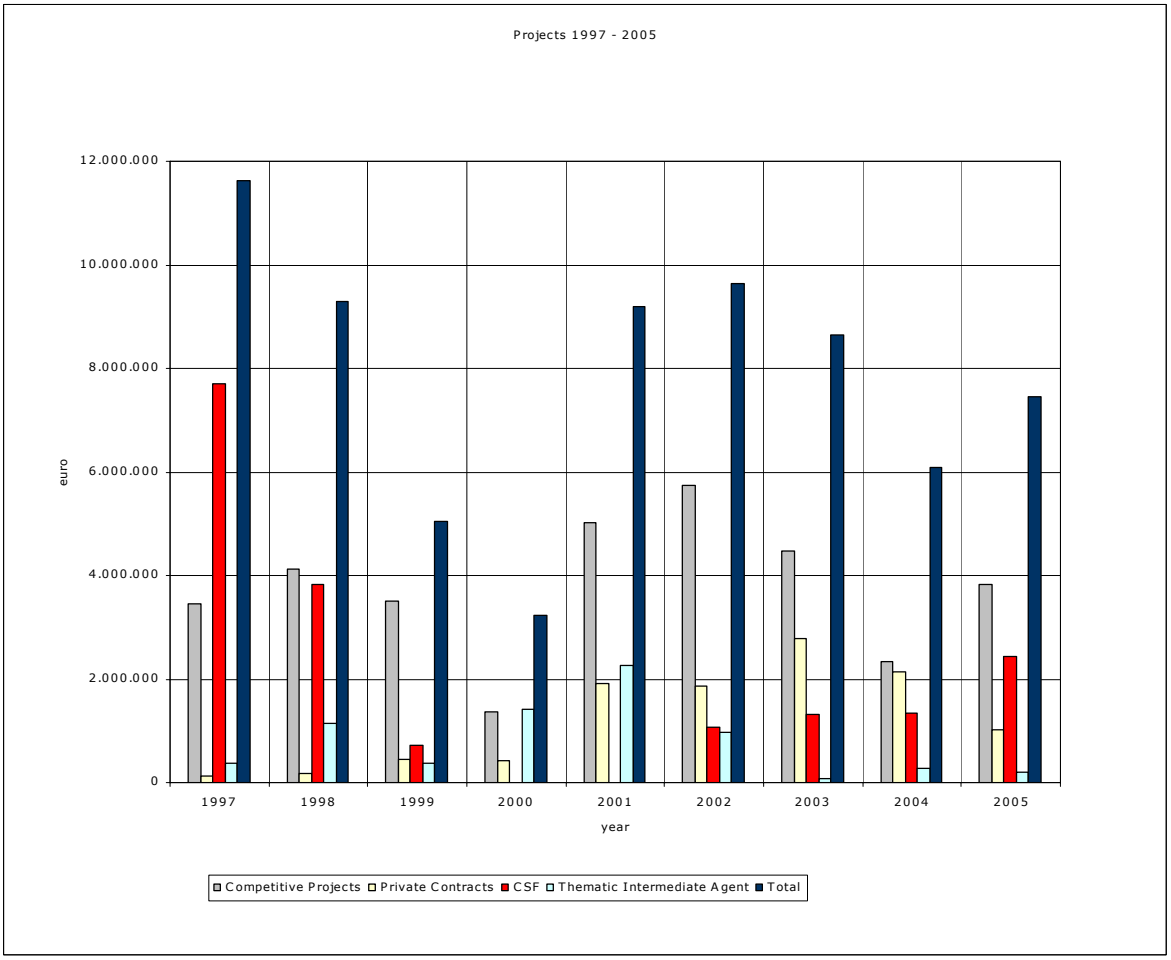


Chart 14: Budget distribution according to project type

2.5.3. PERSONNEL DISTRIBUTION IN 2005

CRES' personnel, permanent staff & staff under contract was 149 persons for the year 2005.

According to the attached chart, the vast majority of the personnel (~75%) is comprised of university graduates and post-graduate title holders.

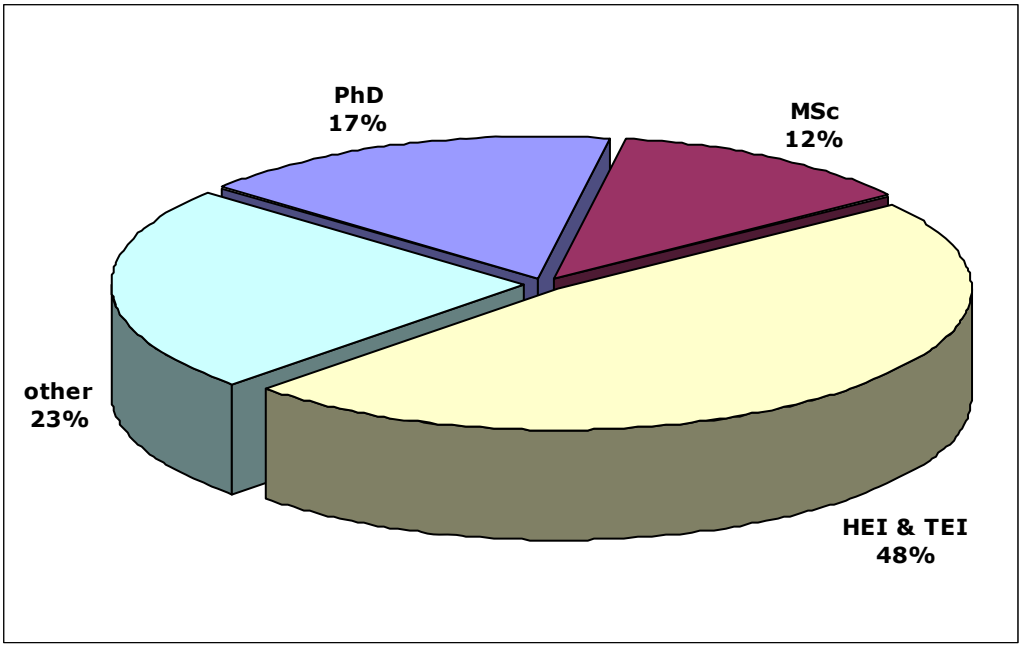


Chart 15: CRES personnel according to educational background (2006 data)

	2001	2002	2003	2004	2005
Personnel	130	155	158	159	149
EU Income Line	6.341.673,34	2.025.108,34	1.747.935,71	2.089.980,16	1.839.290,70
National income Line					
A. Ordinary Budget	404.255,32	440.623,62	647.750,00	243.000,00	938.000,00
B. PIP	3.181.893,55	2.152.941,29	2.439.217,31	1.618.128,13	2.225.630,17
Private contracts					
A. within Greece	1.929.355,85	1.881.160,96	1.546.696,84	2.487.157,67	1.913.364,84
B. Abroad	382.227,06	274.557,33	601.706,44	457.488,88	93.022,07
Other Income	103,849,35	65.086,95	53.568,70	60.596,87	26.316,72
TOTAL Income	12.343.255,47	6.848.252,82	7.036.875,00	6.956.351,71	7.035.624,50

Table 7: Personnel data and income over a 5-year period (2001-2005)

3. ACTION PLANNING FOR 2006

3.1. ENERGY POLICY STUDIES IMPLEMENTATION AND INVESTMENT PROGRAMME MANAGEMENT IN THE FIELDS OF RES AND RUE/ES

Considering the State support on the development of the legal framework and the investment management in the fields of RES and RUE/ES, CRES targets for 2006 are the following:

1st Expanding the support of the Ministry of Development

More specifically, CRES will support the Ministry of Development:

- In any process for the revision of the legal framework regarding the promotion of RES and RUE/ES
- In the creation of the action tenders of the OPC, with the specialisation, planning and design study of projects and sub-projects for each action, as well as with the creation of the support regime and guides for the starting process of these projects
- In the evaluation of all investment proposals that will be submitted in the framework of the OPC tenders. In this context, CRES is currently composing a study, which will include the international and national experience on the use of Natural Gas in vehicles, the expansion of the technology trends of the car-industry and the manufacturing and sale of vehicles running with natural gas. The study's aim is to make proposals for the content of a promotion framework for the use of vehicles running with natural gas

2nd. Involvement in the framework of the Thematic Intermediate Agent OPC

CRES is managing the project of the Thematic Intermediate Agent του OPC for wind-energy projects. In parallel to these, it'll support other intermediary authorities (Development Association of Managing European Programmes for Thessaly and Sterea Hellas, Administrative body for W. Greece – Peloponnesus – Epirus & Ioanian islands) in the technical monitoring and delivery of their projects.

3rd. Extending the cooperation with RAE

Since 2003, and following a tender, CRES has been supporting RAE with regard to RES and Cogeneration investment appraisal projects. This cooperation is bound to continue in 2006 and apart from this, cooperation on other issues that may arise, such as tenders for various actions by RAE for RES, Cogeneration, Energy Saving, etc.

4th. Promotion of Energy management promotion in the tourist sector and preparation of similar actions in industry with a parallel accreditation of CRES in energy management issues

CRES has already contacted the national Chamber of Hotels for the accreditation of the energy management system in hotels, as provisioned by the Presidential Degree 43/2002. In addition, CRES, will get prepared for the energy management promotion in industry as well.

5th. Preparation for institutional matters that will be of concern for the energy market, i.e. 'green certificates' and 'emissions trading', but also other institutional issues of energy policy that have an impact on RES and ES.

CRES already participates in a relevant project in the context of the LIFE programme. In parallel, it seeks its participation in partnerships that determine the wider European policy, with the aim of implementing it in the country into the Greek area.

6th. Promotion of institutional issues for sitting of RES installation

In this context, CRES participates as a Consultant in the study for the "Special Landplanning Framework and Sustainable Development for RES" aiming at the study of the directions to be followed in respect to sitting RES installations in the framework of a relevant tender by the Ministry of Environment, Urban Planning and Public Works.

7th. Promotion of the environmental assessment of RES

The implementation of the environmental assessment is under way on the impact of the RES projects and their comparisons with equivalent projects of conventional energy sources.

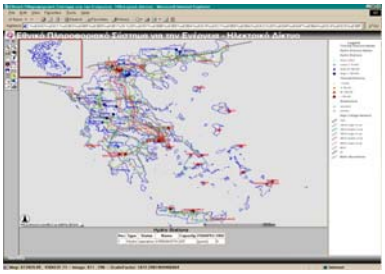
3.2. ENERGY PLANNING AND RES & RUE/ES TECHNOLOGY PROMOTION

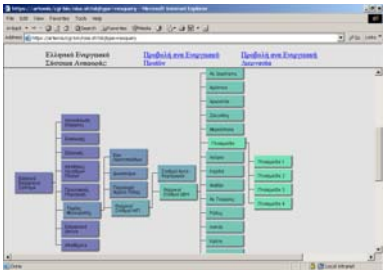
Regarding the Energy Planning support and the RES and RUE/ES technology development, CRES' targets for the year 2006 are the following:

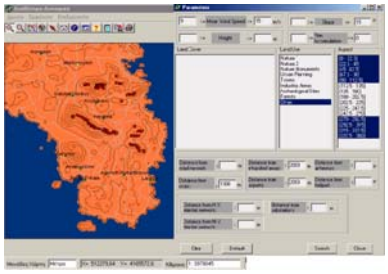
1st. Expansion of the support to the Ministry of Development

More specifically, CRES will support the Ministry in decision making matters about Energy Planning through the computational infrastructure and experience gained thanks to the OPE and their expansion owing to the 3rd Community Support Framework (CSP) funds. The computational infrastructure concerns electricity market simulation issues, electricity network capacity in RES investments, parametric analysis of energy investments and finally, ongoing calculations of the RES/RUE/Cogeneration potential

2nd. Contribution to the National and European Energy Policy through supportive actions of promotion, education and energy market analysis







More specifically, the following are planned:

- The development of supportive actions on investment promotion in RES and RUE/ES through 3rd CFP funds.
- The implementation of new energy technology and vocational training dissemination projects for those directly interested in the framework of the European programmes "Intelligent Energy for Europe", 6th Programme Framework, "Leonardo Da Vinci", etc.
- Implementation of market analysis actions, with emphasis on the lifting of non-technical barriers for the RES/RUE/ES technologies in the framework of the European programmes "Intelligent Energy for Europe" and the 6th Programme Framework

3rd. Reinforcement of the cooperation between the European and Mediterranean Energy Centres

Reinforcement of CRES position in the EnR and MEDENER network, with an emphasis in the Mediterranean region and efforts for further development of the cooperation between the Balkan and Central European countries.

4th. Increasing the amount of the supportive actions contracts on investment programmes in the international market

The aim is to increase the market share for CRES in projects pertaining to the supportive study actions in the context of the international investment programmes, like those financed by the UNDP, the World Bank, the EIB etc.

5th. Further promotion of the products and services developed by CRES

Improvement of the support mechanisms aiming at the promotion of products and services of CRES through the CRES Liaison Office.

3.3. RESEARCH AND APPLICATIONS OF RES TECHNOLOGIES

Regarding research and technological development in the field of RES for the year 2006, CRES is bound to focus intensively on the following sectors:

1st. Utilization of the "Aristeia" National programme funds, following the results of an evaluation of the research institutes of the country

CRES relevant technical dossier with a total funding of 246.913€ and with an operational time-frame 2006-2007 has been approved. The project aims at the reinforcement of excellence in wind-turbine technology matters and wind energy storage through hydrogen production

2nd. Utilization of the possibilities offered by the 6th Programme Framework for actions on Research, Development & Demonstration for RES technologies, as well as of the "Intelligent Energy Europe" Programme



CRES has participated actively in the preparations of research proposal submitted to the calls of the 6th Framework Programme in December 2005 for both long term and short term R&D actions. In addition, CRES has responded successfully to the relevant calls of December 2004. As a result, eleven new co-financed projects are expected to take-off in 2006. More specifically, in early 2006, the complete (IP) UPWIND project with the contract number 019945 (SES6) will start and it will deal with complete wind turbine design. The total budget is 1.607.000€ for a five years period.

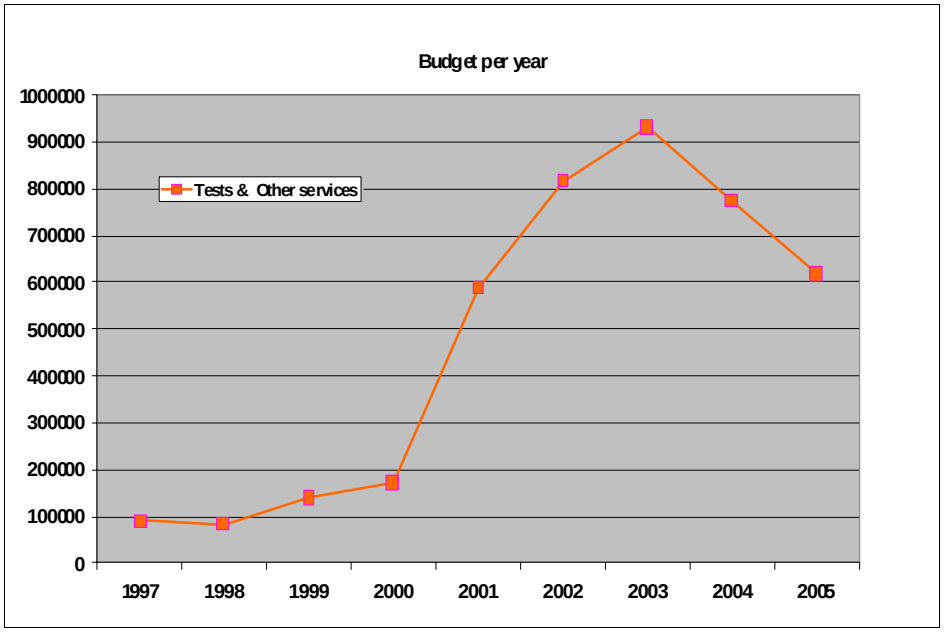
3rd. Reinforcement-consolidation of CRES revenues coming from the provision at specialised services to the market, mainly from the Wind turbine Testing Laboratory

The prospects for 2006 are positive. New contracts are expected during the forthcoming months, by wind turbine manufacturers for the accreditation of new wind turbine prototypes, as well as investors for the verification of the turbines performance.

In addition to the aforementioned projects, the Wind turbine Testing Laboratory is developing new services emphasising on sitting evaluation as well as on the wind park performance, the wind potential measuring through Doppler techniques (SODAR and LIDAR) and the consolidation of new partnerships that will ensure the possitive growth.

The development of activities in Cyprus is yet another desirable option, as well as in other neighbouring countries (concerning energy studies), for the implementation of which intensive collaborative actions are necessary.

Chart depicting CRES annual revenues from the Wind turbine Testing Laboratory activities from 1997 to date



4th. Reinforcement/expansion of the Centre infrastructure (mainly laboratories) according to a five year development plan

CRES will forge ahead with the development of the following laboratories and/or the upgrading of the already existing ones through the 3rd CFP funds:

- Energy Awareness Park in Keratea (Attica): in the framework of the 2.1.1 action of the OPC, CRES has reserved a budget of 2.273.298,91€ and sets on with the Energy Awareness Park implementation in the premises of the demonstrative Wind Park in Keratea. The three year long project started in October 2003. The largest part of the project will take place in 2006 will include the park's infrastructures (landscaping, path construction and amphitheatre) and the technical equipment for presenting the technologies involved.
- Hydrogen production unit from Wind energy: The unit was implemented in the framework of the research project of the 5th Framework Programme. It's a pioneering project for Greece entailing a wide range of possibilities for applications favouring greater RES penetration in island systems. The unit will be reinforced with a fuel cells system in the framework of the Energy Awareness Park project and part of the ffunding for its development will be supported by the national "Aristeia" programme.
- Interconnected 40kWp PV systems in CRES: In the framework of the European PV Enlargement project, six new 40kWp PV systems were installed in CRES. The series were complemented with measuring systems for the assessment of their operation and the use of their examples in research projects which are under development. In addition, after the issuing of exception for Energy Production License, the processes for the interconnection with the national electricity network have begun.
- Hydrogen and Biomass Thermo-chemical Conversion technology laboratories: These two laboratories aim at the obtainment of new equipment that will allow CRES to monitor the developments in two important technologies. This 877.172€ project will be funded by the action 4.5.1 of the OPC. The project began in May 2005 and will be completed in two years time.
- SOLLET: In the framework of this project a heating unit operating 100% on RES (biomass/solar) was completed for the heating of one office building. The unit operates since the beginning of the heating 2005-2006 period and brief results about its operation are expected after the end of that period.

3.4. RESEARCH AND DEMONSTRATIVE APPLICATIONS OF ENERGY SAVING TECHNOLOGIES

Concerning research and technological development in the fields of RUE and ES, CRES is going to be thoroughly involved, during 2006, in the following sectors:

1st. Providing technical consultancy services to Public authorities on Energy-saving matters



These will concern the following:

1) Promotion of the Draft Plan regarding the Energy Efficiency in Buildings Regulation.
2) Providing the necessary legal and technical support, in the context of the new Community Directive for "Energy Performance in Buildings"
3) Technical and energy monitoring of the projects to be implemented in the context of the Operational Programme for Competitiveness (OPC) by the Ministry of Development in the regions of Thessaly, Sterea Hellas, Peloponnesus and West-Greece
4) Energy and economic data analysis for all the energy-saving projects implemented in the context of the Investment Business Plan.
5) Development of directives/accreditation procedures of energy management in the hotel and industry sectors

2nd Technical support of the RUE/ES market

The basic actions in this sector will include:

a) Cooperation with material and building components industries for the improvement of their energy performance.
b) Technical market support (industrial sector) for the control/measurement/ calculation/evaluation of the energy performance and accreditation of construction materials, components and systems.
c) Technical market support (researchers, construction companies etc.) for the Energy Design of buildings and open spaces aiming at the application of the new legal framework for Energy Efficiency in Buildings.
d) Development of CRES existing laboratory infrastructure with the purpose of providing technical support to the market and the accreditation of energy studies, as well as the development of computational models of energy performance, natural lighting and air movement.
e) The development and promotion of new transport technologies aiming at energy saving.

3.5. TARGETS AND OTHER FIELDS OF ACTIVITY

In the medium term targets of the Quality Assurance Office of CRES, the following are included:

• CRES accreditation according to ISO 9001/2000

• CRES accreditation according to EN 45004 for the Certification (Control) of Active Solar Systems

• CRES accreditation according to EN 45004 for the Certification (Control) of Building Materials

• CRES accreditation according to EN 45013 for the Certification of Energy Auditors

• CRES accreditation according to EN 45004 for the Energy Certification (Control) of Buildings

• Accreditation according to ISO 17025 of other CRES laboratories

Concerning the planning of the **Financial Services and Management** Directorate of CRES for the year 2006, the main target is the improvement of internal procedures with respect to support the various Departments for the smooth implementation of their projects.

The target is the optimisation of the internal procedures and the most efficient financial and legal monitoring of the Centre's activities. In addition, the effort of shrivelling the financial performance of the Centre will continue in order, on one hand, to cut-down on spending and on the other, to accomplish the timely influx of the expected revenues, facilitating this way CRES' overall smooth operation.

Besides these, during 2006 and in the context of the AKMON Programme of the General Secretariat for Research and Technology, the Technical Services DPT is expected to create additional office and other space in the premises of the laboratories. In the meantime, the Technical Services is also expected to focus its efforts in finding the necessary funding for the upgrading of the Centre infrastructure, among which, the creation of a road-junction for the Centre's entrance on Marathonos Avenue, as well as the maintenance and improvement of the existing facilities.

3.6. NEW PROJECTS FOR THE YEAR 2006 WITH THE PARTICIPATION OF CRES

As of the beginning of 2006, the implementation of 16 new projects related to the **Energy Policy Support** and **Energy Planning**, are bound to begin. These projects, forthe necessary contracts have been signed, are in the framework of the Intelligent Energy for Europe Programme.

Besides these, there are various proposals that were submitted to the European Commission for 2005 by CRES, that haven't as yet been completed and their evaluation, approval and implementation are still pending.

Equally, as far as the **new research projects in the fields of RES and RUE/ES** are concerned, there are 15 such projects approved for the year 2006. These projects have been undertaken in the context of the 6th Framework Programme of the European Commission and Intelligent Energy for Europe Programme.

In 2006, two new technical support projects to the European industry on wind energy will begin.

Finally, during 2005, 65 proposals were submitted on the fields of RES, RUE and Energy-Saving, most of them, in the context of the "Intelligent Energy for Europe" Programme and the 6th Framework Programme. More information about the contracted projects and the submitted proposals in the fields of Energy Policy support and Energy Planning, as well as in research and technological development in RES, RUE/ES and Planning, are given on *Annex 3*.

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