

# ACTUAL PROBLEMS FOR ROMANIAN RESEARCH IN THE ENERGY FIELD

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**Abstract – The paper presents the actual situation and the problems the Romanian research in the energy field is confronted with in a period when budget financing has been drastically reduced as to the commitments and the forecasts and the great companies in the energy field have to face major economic difficulties. The paper analyzes the main components of the research-development system of national interest: the national research and development institutes, the higher education institutions, the traditional companies that have RDI activities, the recently established companies with activities in the RDI field. The paper presents some of the results of the Romanian organizations participating in the research programmes financed from national and European funds. The higher education institutions are in the most favorable situation relating to the development of the equipment and apparatus as a result of their participation in the research projects. The dependence of the national institutes on the Nucleus Programmes has increased lately. Many traditional companies that have RDI activities are in a dramatic situation.**

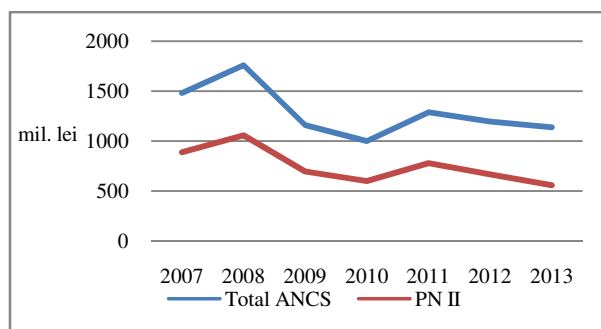
**Key words:** energy, Nucleus Programme, research financing, national research and development institutes.

## 1. INTRODUCTION

The RDI strategy for the period 2007-2013 envisaged a gradual and significant increase in the public RD budget but could not envisage the dramatic changes caused by economic recession. Consequently, the increase did not occur. At present Romania has the lowest RD intensity in the European Union.

The National Research-Development -Innovation Strategy 2014-2020 [B1] points out that the „RD sector in our country is undersized. On the one hand, this is due to the reduced financing. In absolute numbers Romania’s expenditure for research and development per capita is nearly 20 times less than the European average. On the other hand, the demand for RD is very low, is not satisfactorily stimulated and does not stimulate other economic sectors enough. The RD sector proves to be poorly connected both to the business environment and the public at large.” These considerations are generally valid. Nevertheless, they are entirely valid for the research in the energy field.

The National Research Plan II (NP II) funding by ANCS has been drastically reduced in comparison with to the commitments and forecasts (fig. 1). The number of competitions organized under NP II (and, in particular, under the Partnerships Programme), the funding allocated to each competition and even the funding for the projects that had been already contracted, were reduced.



**Fig. 1 Financial Evolution of NP II in the period 2007-2013**

In these conditions, the funding actually allocated under the National Plan II (NP II) for the period 2007-2013 amounted to approx. 5,200 mil. lei in comparison with the 5,000 lei funding initially allocated. The reduction in funding in the years 2009 and 2010 can be explained only as the result of the economic crisis at the national level. Nevertheless, it is harder to explain the reduction in the years 2012 and 2013 as compared to the previous years, although these years have been years with a favorable economic evolution. Thus, NP II funding in 2013 was lower than in 2010. This reduction has strongly influenced all the programmes under NP II and all the fields of activity included in Partnerships, including the Energy field.

The Romanian scientific research financing through the plans of the economic ministries (of the Ministry of Economy in particular, and, at present, of the Ministry of Energy) has been almost insignificant lately. In the last three years these ministries did not organize competitions under the Sectoral Research Plan.

The great companies in the energy sector have been confronted with major economic difficulties that are well-known. SC Termoelectrica declared bankruptcy, SC Hidroelectrica has been insolvent for a long period of time, SC Transelectrica is under special administration regime etc. The foreign capital companies (EON, ENEL, GDF Suez etc) usually resort to the research services

from their own countries.

All these have greatly (negatively) influenced the situation of the organizations that carry out research and development activities in the energy field in our country.

## 2. GENERAL EVOLUTION OF THE NATIONAL RESEARCH AND DEVELOPMENT INSTITUTES

The national research and development institutes represent the first component of the national research and development system of national interest.

These institutes originate from the traditional RDI institutes that have passed through long and painful re-organization/restructuring/privatization processes that have diminished their importance at the national level (in number of employees, equipment and apparatus, themes approached). There was hope that the statute of national institute would bring organizational stability and increase the level of budget funding. This was supposed to lead to their re-invigoration and increase in the level of competitiveness, but this desideratum has been only partially accomplished.

There are 49 national research and development institutes under the coordination of the Ministry of Education and Research. Some of them (ICEMENERG Bucuresti, ICPE-CA Bucuresti, COMOTI Bucuresti, ICSI Râmnicu Vâlcea, ICMET Craiova etc) have important preoccupations in the energy field. Preoccupations in the energy field have also got the National Institutes in the Physics and Chemistry field (IFT Iași, ECOIND București, ICECHIM București, INOE 2000 București etc.).

Mention should be made of INCD URBAN INCERC București with important activities relating to building energy efficiency.

The economic situation (and the activities carried out, implicitly) of the national institutes has been greatly influenced by the economic evolution of economy on its whole and, implicitly, by the funding allocated to scientific research from the budget.

Fig. 2 presents the evolution of the total turnover of nine national RD institutes with significant activities in the energy field (ICPE CA Bucuresti, IPCUP Ploiesti, ICSI Ramnicu-Valcea, COMOTI Bucuresti, ICMET Craiova, IFT Iasi, ECOIND Bucuresti, ICECHIM Bucuresti and INOE Bucuresti) in the period 2008-2013.

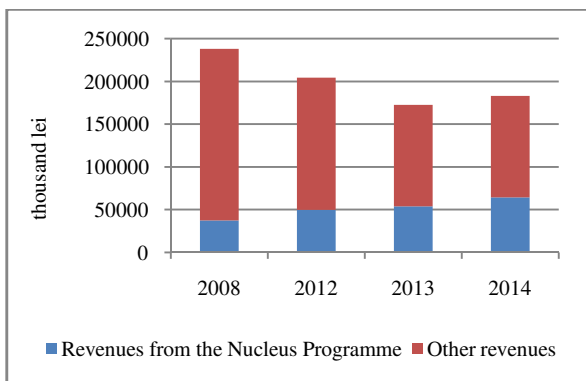


Fig. 2 – Evolution of the total turnover in the period 2008-2013

Mention should be made that in 2013 this indicator was only 72% in comparison with the year 2008. It is surprising that in 2013 an important decrease against the year 2012 was registered, although, officially, the year 2013 was a year of economic development. In 2014 a certain increase in comparison with the previous year was registered but the value was under that registered in 2012. It should be further specified that the values of the turnover are current values that do not take into consideration the increase in prices/inflation in the respective period. By taking into consideration this last factor the great economic difficulties the national institutes were confronted with in the analyzed period appear even more pregnant.

The decrease in the National Research and Development Institute (NRDI) turnover points out the lack of development possibilities of the equipment and apparatus, of means to motivate the existing personnel and/or to hire new specialists etc.

At the same time, it is remarkable that, despite these difficult conditions, the national institutes with activities in the energy field continue to play an important role in the field and, in our opinion, this is mostly due to the professional devotion of their employees (whose average age, nevertheless, is dangerously increasing).

The Ministry of Education and Research has made efforts to ensure the main funding sources for the NRDI in the economic crisis conditions through the Nucleus Programme. In the period 2008-2014 the nine NRDI selected also benefitted by a 72% increase in the amounts allocated through the Nucleus Programme. Nevertheless, this could not compensate the decrease in the revenues from other sources, revenues that decreased by almost a half.

Thus, the share of revenues from the Nucleus Programme within the total turnover increased from 16% in 2008 to 35% in 2013.

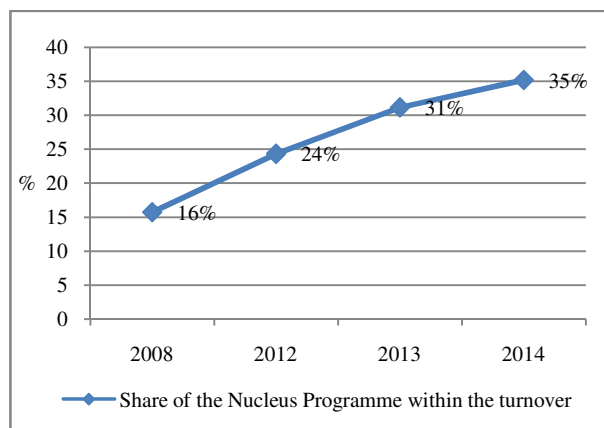


Fig. 3 Evolution of amounts from the Nucleus Programme in the turnover

The financing through the Nucleus Programme (undoubtedly very useful for the NRDI that have benefitted from it) has represented just a palliative without managing to make up entirely for the unfavorable situation.

### 3. GENERAL EVOLUTION OF THE HIGHER EDUCATION INSTITUTIONS

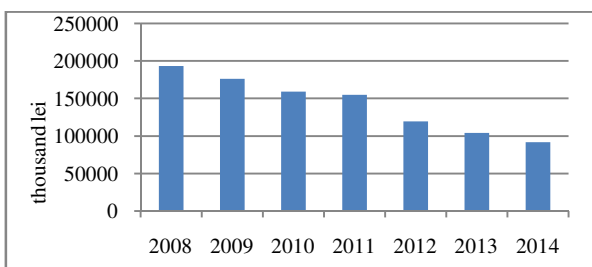
The accredited higher education institutions and their structures also represent a very important component of the research-development system of national interest and, according to the information we have at our disposal, the one with the most favorable evolution. As early as the '90s, the universities from Romania benefitted from important financing from international programmes explicitly designed for higher education (TEMPUS, SOCRATES, LEONARDO etc). Their participation in these programmes has increased the mobility of higher education experts and international contacts and relationships on the one hand, and has developed the equipment and apparatus base at their disposal.

In the last decade an "Executive Unit for Higher Education and University Scientific Research Financing" (UEFISCU) has functioned under the administrative subordination of the Ministry of Education and Research. At the same time, the National Council for Higher Education Financing, the National Council of Scientific Research in Higher Education (that had UEFISCU under functional subordination), the National Council for Statistics and Forecast of Higher Education etc., have been established. This has contributed to a great extent to the development of the of University scientific research that has enjoyed the attention of the decision-makers in the first place.

The phenomenon also continued after Romania became a Member of the EU. Several hundreds of research centers in all the fields of activity have been established in the universities existing in our country. Thus, the energy/electrical engineering faculties have established centers of direct interest to the energy sector their number being also high. Some of them have benefitted from a considerable financial support under the international programmes, or under Capacities programme of NP II.

### 4. GENERAL EVOLUTION OF THE TRADITIONAL COMPANIES THAT CARRY OUT RDI ACTIVITIES

At the national level there are numerous companies with important RDI activities in the energy field. Many of them (the most important ones, in our opinion) have originated from the former research-design institutes that have been turned into companies and restructured after 1990. In order to have a clear image of their evolution in the last years, six such units have been selected and the same indicator (the turnover) has been used in order to characterize this evolution. The results of this analysis are synthetically presented in Figure 4.



**Fig.4 Turnover evolution of six companies with RDI activities in the period 2008-2014**

The turnover of the companies with research activities in the energy field registered a major decrease in 2014 as compared to the year 2008, greater in the case of the NRDI which had a continuous character.

There are extreme situations. Some research institutes of great tradition and with valuable assets were extremely interesting exclusively due to the land and the buildings they owned.

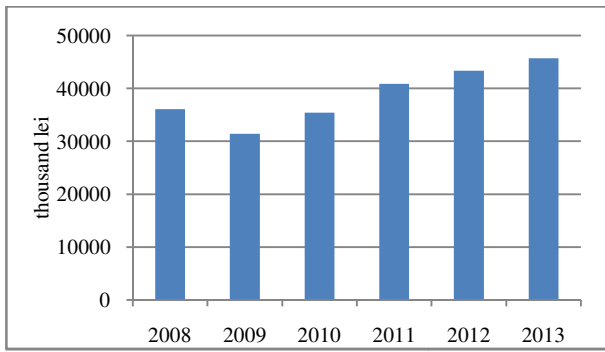
This was the situation of SC OVM - ICCPET SA Bucharest. This was the oldest and the most important institute in the energy field from Romania which originated from the Energy Institute of the Romanian Academy established in 1948 for solving the scientific research issues in the field. In the course of time the institute boasted a great prestige at the national and international level and was endowed with modern equipment and apparatus in the Vitan Road location. After privatization in 2001 it became OVM - ICCPET. Afterwards, in 2007, the investor sold the land on Vitan Road and a mall was erected on the respective plot of land. The company continued to carry out its activity in a space rented from Electromagnetica Company and its decline continued at an accelerated pace. In 2013 the Bucharest Court of Law pronounced its bankruptcy.

The SC National Wood Institute SA Bucuresti, established in 1933 under the name of Research and Experimentation Institute for Forestry, is in a similar situation. After a series of reorganizations, in 1992 the SC National Wood Institute SA was established. It carried out valuable research work on biomass utilization. In 2011 the institute declared bankruptcy.

The period 2007-2014 was entirely unfavorable to the traditional research institutes organized as companies with activities of interest for the energy sector. This has made it difficult to establish highly trained research groups at the national level.

### 5. GENERAL EVOLUTION OF THE NEWLY ESTABLISHED COMPANIES WITH RDI ACTIVITIES

In the analyzed period of time numerous newly established (as SC or SRL) companies, included in the SME category, that have research included in their memorandum of association, have also carried out their activity. They are increasingly present in the specific market, including through their participation in the NP II and FP 7, proving very aggressive in the positive sense of the word. We have selected at random 14 such companies participating in projects in the energy field from the NP II and FP7.



**Fig.5. Evolution of the total turnover of 14 limited responsibility companies newly established participating in the NPII and FP7**

According to Fig. 5, the total value of the turnover accompanies qualitatively the evolution of the macroeconomic indicators at the level of the national economy. The year (a year of powerful economic recession) was the year when the lowest figure was registered. Afterwards, the evolution was positive. This confirms the theory according to which the SMEs represent the market segment that adapts the easiest to the market economy.

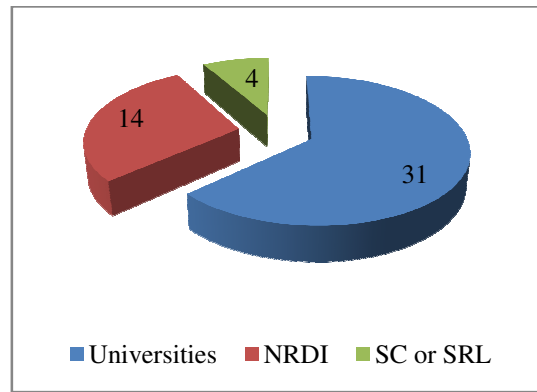
In Romania there appeared and developed new firms included in the SME category with RDI activities in the energy field. The respective market segment is not entirely consolidated, but it has a general positive evolution. Some firms have already gained prestige.

It is difficult to assess to what extent the development of these companies will compensate the decline of the former research institutes organized as companies so that the scientific research they carry out represent a progress at the national level.

There are also certain specific research and development activities carried out by non-governmental / professional organizations whose memorandum of association includes such activities. Frequently, renowned specialists carry out their activity in such associations thus increasing their professional level. Nevertheless, in our opinion, NGOs cannot play the “cornerstone” role in Romanian research in the energy field. They can only play a complementary part/ add to it.

**6. PARTICIPATION OF THE RDI UNITS IN THE RESEARCH PROJECTS FINANCED FROM NATIONAL FUNDS**

The competitions organized in 2011 and 2013 under Partnerships Programme in the energy field (mention should be made that in 2012 and in 2014 no competitions were organized) have been analyzed. In these competitions 49 projects obtained financing from the budget, out of which 31 projects were carried out by consortia coordinated by higher education institutions. The results are synthetically presented in Fig. 6.



**Fig.6 Institutions that coordinated the winning projects financed under the Partnerships Programme in the energy field, competitions organized in 2011 and 2013**

It is worth mentioning that higher education institutions have been the project leaders of the great majority of the winning projects.

We reach the same conclusion if we analyze other research programmes financed from the budget.

**7. PARTICIPATION OF THE RDI SYSTEM UNITS IN RESEARCH PROJECTS FINANCED FROM EUROPEAN FUNDS**

In 2014 the European Association of Development Agencies (EURADA) published the report “Participation of EU13 countries in FP7”. The Report aimed at evaluating the participation in FP7 of the 12 countries that became EU Members in 2005 and in 2007 (New Member States - NM) for identifying the measures for improving their participation in the HORIZON 2020 Programme. Some synthetic information and comments will be further presented.

Romania has had 862 participations in FP7; we should underline that the counting is multiple in the sense that in case the same organization has participated several times it was counted each time it has participated. The number of participations is lower than Hungary’s or of the Czech Republic, although Romania is twice as big, and has been practically equal to that of Slovenia, although Romania’s population is 10 times greater.

The rate of success as to the number of projects submitted was of 14.6%, the lowest of the NM countries (the NM average was 18.48%). The rate of success in Euro was minimum, too (8.5% against the NM average of 12.18%).

The amount in Euro due to a Romanian organization for participating in FP7 was of 138051 Euro as compared to a NM average of 166908 Euro and a EU 28 average of 324116 Euro.

The most notable performance of a Romanian institution participating in FP7 (in all programmes) is that of Politehnica University Bucuresti with 36 participations. Thus, PUB is on the 24<sup>th</sup> place in Top 30 of the participants from the NM in FP7 (where the first place is held by the University from Ljubliana with 137 participations).



At the national level (Top 5 Romania), the most successful organizations are:

- Politehnica University Bucuresti – 36 projects
- University of Bucuresti – 29 projects
- Technical University Cluj-Napoca – 26 projects
- Executive Unit for the Financing Higher Education, Development and Innovation – 26 projects
- University Babes Bolyai Cluj Napoca – 21 projects

In Cooperation Programme, Energy sub-programme, Romania had 19 participations in comparison with Poland's 56 participations, Hungary's 29, and Bulgaria's 23.

While Romania's overall participation in FP 7 was modest, and the participation in the Energy field registered a very low participation. This is an alarm signal meant to draw the attention to the level of performance of the Romanian research organizations in the energy field.

This is confirmed by the participation of the Romanian research organizations in the European Energy Research Alliance (EERA).

EERA reunites more than 150 research organizations (public research institutions and universities) and represents a very important element in the drawing up of the European research strategies in the energy field.

The participation of universities in EERA is made through the European University Association. Mention should be made that the 32 universities from Romania are members of this association that includes the main universities in the energy field (Bucuresti, Cluj-Napoca, Iasi, Timisoara, Brasov, Craiova).

Romania participates in EERA through two institutes, namely:

- The Geological Institute of Romania - Bucuresti (that has the statute of NRDI)
- The Institute for Nuclear Research Pitesti (subsidiary of the Autonomous Authority "Technologies for Nuclear Energy - RATEN).

It should be underlined that no NRCI, or company with research activities in the energy field, is EERA member.

## 8. CONCLUSIONS

The RDI Strategy for the period 2007-2013 envisaged a gradual and significant increase in the public RD budget but could not foresee the dramatic changes caused by economic recession. Consequently, the increase could not be made.

The overall funding through ANCS of the NP II witnessed a drastic decrease as to the commitments and forecasts. The scientific research financing through the sectoral plans of the economic ministries (of the Ministry of Economy and, at present, of the Ministry of Energy, in the first place) was practically nil. In the last years these ministries did not organize competitions for the Sectoral Research Plan.

The great state-owned companies from the energy sector have been confronted with major well-known economic difficulties. Therefore they could not finance research –development projects.

The foreign capital companies (EON, ENEL, GDF Suez etc) usually resort to the research services from their country.

The economic situation (and the activities carried out implicitly) of the national research and development institutes has been greatly influenced by the economic evolution at the level of economy and of the budget funding for scientific research implicitly.

The accredited higher education institutions and their structures also represent a very important component of the research-development system of national interest and, according to our information, the component with the most favorable evolution.

At the national level there are companies with important RDI activities in the energy field that originate from the former research and design institutes turned into companies that have undergone great restructuring after 1990. Their turnover has greatly decreased after 2008. There are also extreme situations. Some well-known research institutes with long tradition in the field went bankrupt and stopped their activity (SC OVM - ICCPET SA Bucuresti – former Energy Institute of the Romanian Academy, SC National Institute of Wood SA Bucuresti etc).

In the period 2008-2013 numerous newly-established companies (as joint stock companies or limited responsibility companies), included in the SME category that have scientific activity included in their Memorandum of Association (SC or SRL) have appeared in this field. It is difficult to evaluate to what extent their development will compensate the decline of the former research institutes.

The return of the research and development activity in the energy field to a positive trend requires:

- Ensuring the budget funding according to the provisions of the official documents.
- Introduction of legal provisions that will stimulate the companies in this sector to invest in scientific research.

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