

Anexa 2 – Formulare/ B

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|--------------------|---------------------------------------|-----------------|---------------------|
| Programme | | | CEEX/ Form B |
| Module | Complex research&development projects | Type of Project | P-R&D |
| Proposal's Acronym | SECEE | No. | |

| | | | | |
|--|--------|------|---------|------------------------------------|
| Thematic Fields S/T*) (3 thematic fields) | Code 1 | 5.2 | Title 1 | Renewable electricity generation |
| | Code 2 | 5.7 | Title 2 | Smart energy networks |
| | Code 3 | 5.9 | Title 3 | Knowledge for Energy policy making |
| Technological Platform **) | Code 1 | PT 3 | Title 1 | Embedded systems |
| | Code 2 | PT17 | Title 2 | Clean power |

*) according to Annex 1 – Activities / Thematic Fields S/T

**) according to Annex 1 – Activities / Technological Platforms (for complex projects)

B – PROJECT PROPOSAL DESCRIPTION

1. PROPOSAL'S TITLE IN FULL

WIND ENERGY CONVERSION EQUIPMENTS SERIES AND THEIR WAYS IF CONNECTED TO THE NATIONAL ENERGETIC SYSTEM (SECEE)

1.1 Thematic fields S/T:

5.2 Renewable electricity generation

1.2 Proposal's abstract:

In September 2001, The European Parliament approved the 77th Directive concerning the promotion electric energies product from renewable sources (E- SRE). The objective of the directive represents its growth until year 2010 of the renewable sources energies contributions from 14% to 22% of the crude consumption of the electric energy from the member states.

Among the reasons to promote E- SRE, there were enumerated, in the first instance, one of economic nature (it appeared after oiler crisis from year '70), whereat added one of medium (chiefly after signing the Protocol from Kyoto in December 1997), and there was currently added a reason of social nature(the business forces of labor, public support by being aware of SRE benefits over the environment and population's health and of the socio-economical coesion.

The EU directive defines the renewable sources of energy (SRE) as being: the wind energy, solar energy, geothermal energy, waves' and tides energy or the technology of energy cogeneration (the generation of termal and electric energy), etc, letting the member states the possibility to choose, depending on the development of the internal market of energy, leaving the European Comission to propose a common suport diagram.

77 th directive also specifies that the connection and supervision of the producers of electrical energy must be done mandatory, without affecting the fiability and safety of the electrical networks. So, our country drew up a series of new normative papers regarding promotion of SRE among which it numbers.

- The law nr. 318/2003 gives the legal frame of settlement for develloping the activities in the electrical energy branch. Energetical politics developed by the ministry has in sight the development

of SRE, adjusting the priorities in question of the supply with electrical energy of the insular placements;

- Decision 443/ 2003 concerning the promotion of the energy products E- SRE;

- HG 890/ 2003 what identifies the targets (touch of a interest of 30% from the national crude consumption of electrical energy), the objectives, programs and financial sources for the energy politics implementation;

- HG 1535/ 2003 for "strategy of valorification of the renewable energy sources".

- Law 143/ 1999 concerning state help that settles the methods of authorization, grant, check, inventory, monitorization and reports of the state help in order to create and maintain of a concurential normal medium, etc.

The wind is a regenerative energetical resource that can not be exhausted, frequently used by man. Is approximatively 2% from the total of active sun energy that arrives on earth which transforms into wind. The wind has a main disadvantage that is the fact that the direction and intensity of the force is variable. In order to assure electric consuming constant power, there must be used systems for storage or for transferring it to the the electrical grid, such as banks of capacitors or electrical transformation points. The ideal wind machine, as a whole, has approximatively 59% efficiency.

The useful power of this type of machine is affected by many factors, such as: the angle of adjustment of the blade, the power of the electrical generator and also the geographical conformation of the installation area.

The main element of this equipments of electrical conversion of the wind energy is represented by the electrical generator, that is sincron type generator with permanent magnets of high energy and low turation, enabling its direct cupling at the wind turbine. This has eliminated the mechanical multipliers of rotation which have problems in functioning and supplementary big power loss in the chain of conversion for mecanical power.

This type of synchronic generator can be found in most of other technologies of electromechanics conversion (geothermal energy, wind and tide's energy or coenergy technology), fact that imposes most the research and development of synchronic machines with low revolution. isolated users who need a relatively low power energy (12 ... 15 kW instalated power), there is not necessary an adjustment on the voltage given by the sincron generator. The power input is directly supplied for the users and the eventual excess is stored. If there is necessary to make the connection to the national electrical power, the equipment must be fitted with an electronic system that permits the adaptation of electrical parameters so that the connection to the national electrical power is permitted , no matter other factors.

In our country, although there were extended an array of sincron generators, created mainly for functioning in diesel generating set, with/without associated excited machine, in reverse construction and rotative rectifier, these are not useable in the applications mentioned above

In our country there is the specialized force of labor, but with a reduced level of remuneration

that permits the realization and development of the product performance assuring the entrance on the international market of SRE of specialized enterprises. Also, there is predicted that the collaboration relationships between the Romanian and foreign firms are tying up. There are several firms from EU that are already buying palettes for the wind generated engines made by Fortus SA located in Iasi.

2. PRESENTATION OF NATIONAL AND INTERNATIONAL CONTEXT WITHIN THE MENTIONED THEMATIC FIELDS:

Although there were several essays in our country to develop equipments for conversion of wind energy, these are not significant. This is not only because of the technical difficulties in construction of the primitive electrical machine, but also because there aren't many regions where this investment may be sinking.

So, SRE represents 13,5% from the total of existing primary resources. From these, hydroelectric energy represents 2%, energy from fuels and biodegradable residues 10,8% and other resources 0,5%. In 2001, there were produced 15,5% in UE, from the total of electrical energy, from renewable sources regenerabile.

Using the the information supplied by the International Agency of Energy(IEA), published during 2003, results that the systems of electrical energy production from wind energy was 32.037 MW at the end of 2002, with 61.500 eolien turbines. In Europe, from the total of 23. 832 MW installed, about 12. 000 MW are installed in Germany and 5.042 MW in Spain

Wind plants have standardized powers from 100 kw to 5 MW/unit. In the present, the wind energy equipments market is covered as follows:

- units with powers lower than 750 Kw, 14. 3%
- units with powers between 750 Kw and 1500 Kw, 55. 7%
- units with powers between 1500 Kw and 2500 Kw, 30%

Although there exists renewable primary resources, only the hydroelectric energy is exploited for electrical energy production. There were obtained 15.650 GWh in 2002..

In the year 2010, in Romania, the electrical energy produced from SRE must represent 30% from the national crude consumption of electric energy. For achieving this target, and by ecological reason that oppose to the construction of a new hydro-electric plant, there must be promoted other technologies of obtraining electrical energy. The actual development of SRE technology, by wind energy, reduced the investment costs, their minimum value being close to classical plants that use coal as combustibile. This is why this technology is often promoted.

Right now, in Europe, there are manufacturers of wind turbines interested in buying the electrical equipment (the sincron generator, equipment for storage of electrical energy, invertor for the users supply, both dc or ac) or to supply the third party with the wind engines. Among these we can mention TRAVERE INDUSTRIE- France, MICON- Danemark, FGW- Germany, NEDWIND-

Nederlands, MARKHAM- United Kingdom of Great Britain, ENERCON- Germany, WINDSOL- Greece and so on and so forth. Also, because the cost of acquisition for electrotechnical materials was increased, there can be noticed an obvious tendency to rise the transfer of the specialized production activities towards eastern european countries which are candidats to be integrated in EU. This can be explained because of the existence of an important, well-trained, low remunerated, force of work.

The progress registered, including our country, in special materials for permanent magnets domain (permanent magnets from rare earts, NdFeB type), permit a new approach on the energetical conversion of power wind, with the perspective of obtaining a generator which responds to the increased requisitions and to supply an electrical power that makes it highly competitive with regards to the account power/ volume/ cost both technical and also economical in international area. The use of the last generation electronical components may help to the construction of an associated equipment that can maintain constant the voltage and frequence into a large range of variation of the generator's revolution and electrical charge.

The research and academic institutes included in the consortium of this research theme number great experts, with many theoretical and practical achievements in electrical machines domain, analysis of their interior magnetic fields distribution, power electronics and surveillance of the complex electromechanical systems. The stage of the existing solutions admits new ones that will lead to the recognition of the romanian school prestige.

Taking into account that in our country, the remuneration of the labour force is diminished, these aspects make so as the developement and prefecion in our country of wind energy conversion equipments to become a priority national development, with valorification possibilities of the equipments on local ground, but mostly international.

3. OBJECTIVES

The general objectives of this research theme is bordered in the general ones of the CEEEX program with reference to the european themes of energy (chapter 5), clearer in **Renewable electricity generation** (chapter 5.2), **Smart energy networks** (chapter 5.7) and **Knowledge for Energy policy making** (chapter 5.9). There must be also taken into account the specific objectives of the first module (complex CD projects) regarding the development of highly complex products and technologies (wind energy conversion and surveillance equipments), products to become competitive until EU adhesion.

The obvious objectives of the present research theme is bond to the perspective of obtaining, in about 36 months from starting the research, results based on proper projects put into practice for representative experimental equipments, that will conduct towards manufacturing, in romanian territory, of representative equipment and products.

On these representative equipments concern, there will be made developed technical projects that will be at the base of the prototype documentation and fabrication. The processing of the theme

consists in finding new solutions and their theoretical foundation.

The proposed research theme finds its place in the National Plan for Research and Development and may be accepted to be financed by CEEEX Programs because:

- the optimization of transversal geometries and the diminuation of the homopolar magnetic fields (that may create electrical currents of circulation between the stator and the impeller and can drive not only to a supplementary raise of the heating but also to the growth of the training couple and electrochemical distruction of the camps surfaces);

- the project pursues the construction of a new equipment, with high complexity (sincron generator with permanent magnets NdFeB, computing equipment software for surveillance and connection to the national grid), attending a high efficiency of the wind energy conversion, conditioned by the international standards and market;

- the project will include the substantiation of research on experimental and functional equipments, with a finality that takes form as complete technical documentation, creating the necessary conditions to get to fabrication and answers to the market's request to make renewable electricity generation

- the execution of the project will be made based on new solutions, optimized and perfected, as a result of analyzing the already existing solutions, that may be breveted

- the theme has to be realized in the environment of a mixt/private consortium, that numbers researchers with an high experience in this area, from universitary centres of research and specialized institutes, including the organisations with international acknowledgement in standardization activities

- The synthetical description of the problems who must be solved as well as the measurable objectives what must be attained are processed in chart 1. We wish to solve all phases in time, on experimental equipment so that the results may be applied gradual in the next phase.

- there will be solved, by physical modelation, the problems bound by a single equipment of wind energy conversion for any stage of standard diameter. Afterwards, and all the other dimensions will be implicit derived

Chart 1

| Year | Problems proposed to be solved | Measured objectives |
|-----------------|--|---|
| 2006 7 month | <ul style="list-style-type: none"> - Technical study with experiments and basic concept - processing the testing methodology | <ul style="list-style-type: none"> - preliminary study and criticized analyse of the solution - comparatively presentation of the solutions currently used in fabrication, with computing technique, the utilized degree of the electrotechnical materials and proposal of new solutions to increase the efficiency of the wind energy conversion - aspects of the european and national standardization in wind energy conversion (performance, dimension/ power/ velocity relation, methods for testing and necessary equipment, rated values) |

| | | |
|--------------------------|--|---|
| <p>2007 12 month</p> | <ul style="list-style-type: none"> - substantiation of the research theme and elaboration of normative standards - electromagnetical calculus of experimental models - checking by using advanced methods of computing of the adopted technical solutions | <ul style="list-style-type: none"> - Settlement of the project theme (defining a series of dimensions) in which will be taken into account the economical criteria to lower the price of the principal materials and the increase of energetical conversion efficiency - the determination of main solution, both constructively, functionally and also substantiation of the preferred theoretical solution - optimization of the electromagnetical circuit of energy conversion by advanced numerical methods (FEM, multicriterial analysis, material properties, dimension, rated performances). Analysis of methods to decrease the cross- coupling given by variable reluctance - the projection of laboratory models to demonstrate the functionality - elaboration of standard for the product and the settlement of technical conditions that needs to be preserved by wind energy conversion equipments |
| <p>2008 9 month</p> | <ul style="list-style-type: none"> - projection of the experimental model - execution and testing of the experimental model, analysis and conclusions - finalization of the standard aspect - development of technical project - dissemination of solutions and technical information | <ul style="list-style-type: none"> - Analysis of the reduction methods of the reluctance torques and the effect of total loss during the process of electromechanical conversion - projection, execution and testing of the experimental model in order to demonstrate functionality - elaboration of developed technical projects and technical information communication at electrical machines manufacturers level, mainly the roumanian users |

4. SCIENTIFIC AND TECHNICAL PRESENTATION OF THE PROJECT:

Purpose of this research theme is to make new products, according to the technical conditions imposed by wind energy equipment users. These conditions impose not only a corelation for nominal power/ voltage series with regard to the operating conditions but also a high stability of functionality for a large area for both power charge and wind velocity variation of the winding equipment. The clear elements what wait to determine the solution under the technical and scientific aspects are bound to:

- development of a construction that assures energetical performances according to the imposed standards
- the optimization of transversal geometries and the diminuation of the homopolar magnetic fields (that can create electrical currents of circulation between the stator and the impeller, currents that will be enclosed into the generator's camp and drive not only to a supplementary growth of the heating, but also to the raise of the training couple and electrochemical distruction of the camps surfaces);
- assure a high degree of reliability in functionaluty by adequately use of electrotechnical materials
- assure the condtions bound to the new international stadards connected to the admitted noise during exploitation

The technical objective of this theme is the compact design that corresponds best to the

requirements of mapping, technical feasibility and economically conditions. A concise analysis of the already known solutions, highlighting the several advantages/ disadvantages, coming to clarify and substantiate the option for the design where is possible to use at maximum efficiency the existing parts for the electrical machine fabrication.

The researchers say that there is possible to interpolate the use of the existing diameters with modifications imposed by efficiency of energetical conversion and the use of the already existing space, and they confirm it by the experimental models. In order to obtain the imposed performance there must be taken into account the use of permanent magnets with rare earth, type NdFeB, to deliver the flux of excitation. There must be mentioned that the utilisation of new solutions with permanent magnets is not an optimum solution. The permanent magnets are not mechanically protected. The mechanical shock (and high magnetical force) may unglue the magnets and block the generator.

Also, the use of a hybrid solution, permanent magnets and a winding for excitation with bidirectional flux, for a rated power of 12 ... 15 kW, is not justified because of the high cost and the energy loss that occurs. If using an island electrical center, the system of adjustment is also not justified. Most important is the immediate use and, eventual, storage for some time of the electrical excess in battery. There can be obtained, economically like, energetic conversion equipments, for insular consumers so that they can function on low revolutions but the frequency of the generated voltage must be almost as the one of the national network (50 Hz) so that the classic consumers can be supplied directly, without any previous modification.

The palpable design of wind energy conversion equipment makes obvious the following scientifically objectives of the design:

- the representation and design of electromagnetical circuits of the synchronous generators in one typical construction with controlled flux leakage is very important

- the determination of the optimum saturation levels in any point of the magnetical circuit is important for efficiency of the energetical conversion and minimized effect of the reaction over the induction field of permanent magnets.

- the elimination of homopolar magnetic fields, that generate currents of circulation throughout the electromechanical conversion machine camps that drive to destruction of bearings, breed the mechanical couples of training, supplementary heating of the electric machine;

- the study, evidence and finding of the appropriate solution for dimensioning of electrical and magnetical circuits so that the synchronous generator may be in concordance with thermal conditions in absence of a fan

- solving the problems of housing bearing, protection and closing up of bearings, in concordance with locations of utilization (desert, marine,)

- the determination of the optimal solution for windings what need to be projected and dimensioned with consideration of existing licences found in possession of the researcher's institute

that offer an overgain both on copper consumption, but also on reducing the Joule type loss and parasite coupling.

- generators must be multipolare, so that at rated velocity, voltage can present a frequency of approximatively 50 Hz. This way the usual electrical machine may be supplied straight with electrical energy and the wind generator assures the raport voltage/ frequency constant

The scientific objectives defined above assure a series of equipment for wind energetical conversion that allows getting the derivated type dimensions, diversified by power, voltage, velocity. Also, the use of insulating material of F (H) class but with termical sollicitation according to B class will increase the reliableness according the theme.

The material of permanent magnets scheduled to be used, is a NdFeB composition, that appeared on industrial market 20 years ago. In present times it has reached stable operating performances in large termal limits. The performance of this material permit remanent induction 1,12 ... 1,15 T, coercive force 8300 ... 8600 A/cm (magnetical field stably until 100 ... 120 °C), so that the wind energy mechanical conversion machine will reach a competitive performance/ weight/ cost raport with foreign products.

Technically, the objectives who must be solved are bind to the projection and making of a set of tools and specifically devices, absolutely needed in making the necessary experimental equipment.

Conclusively it may be affirmed that the technical solutions may permit the achievement of a new product, performant, that answers to all the technical conditions imposed by EU and useful for the internal users

5. PROJECT JUSTIFICATION:

The project is relevant for the autonomous domain of the electrical source and wired equipment adjustment. In existing conditions from our country it is difficult to present the right situation of the project in the national politics of the uses of the wind conversion because there are not elements for identification. But the theme of research is sustained by aim, objectives and thematical directions of the PC7- EC COM but by a future colaboration with EU companies in fabrication and promotion of wind equipments in east and south-east of Europe.

In order to approach this theme there must be taken into account a partnership between the compartiments of research institutes with academic reputation in this domain (UPB, UTCN) and also with acknowledged committees in the activity of standardization (CER). During the research activity we must not forget a real partnership with an essential opening towards industry.

Also, the project may be one of the points underlined in national politics: a product on mondial level (or more) who may be fabricated in our country, for our country and on export terms, in real competitive conditions, economical as well as technical ones. In this case we can contribute to the relaunch of economical units aiming to develop a product and a technology at medium and high complexity, in the preperiod of Romanian integration in EU.

The appreciation of viability of this project has as root the evaluation of technological and technical risks, from an economical point of view as well as its situation into presettled terms.

6. DIAGRAM OF PROJECT EXECUTION:

The project have as finality technically developed projects (technical documentation needed and sufficiently for starting the preparation of manufacturing) for wind energetical conversion equipments. At base of these projects there are theoretical research with high level of analysis and synthesis and experimental research of models projected by the research team, made and tested under test prototypes.

A first aspect solved by the research theme is the manufacturing of a series of sincron generators with great energy permanent magnets. To these there is added the research, projection and manufacture of an integrated system adapted to the generator's performance to connect at the national grid.

The implication of the partner is done in each phase, the tasks are solved in teamwork with few accents on each one's specifics. Therefore, the implication may be detailed as follows:

ICPE-ME has responsibilities connected to study and technical analysis, settle of the constructive technical solution, constructive electromagnetical projection, fabrication and tests of functional models, integration and coordination of all activities and associations with the manufacturer.

UPB and UTCN have responsibilities on regards of study and technical analysis, elaboration of specific computing and analysis methods, fabrication of unconventionally testing experiments in order to clarify any specifica aspects, participation at the final projection of theme and final technical solutions.

CER has responsibilities bind to the study and analysis of national and international standards in this domain, elaboration of the product's standard, the law project with reference to the energy conversion equipment and the proposal for state help.

It has to be mentioned that, as specified in recent European studies, not all the involved parts in developping the wind energy conversion equipment (designer, manufacturer, seller and the human society in general) have the same motivation. As the manufacturer is concerned, he has normally to support the cost for the design, in order to prepare the new series of motors taking into account the costs of the new tools and all the investment related to a new product. It is quite clear that the investment of the manufacturer in order to start the fabrication of the new series of motors is the key point of this chain. This is why, like in other countries, it is compulsory that the institutions of the state to interfere in these actions by a combination of compulsory rules and some incentives.

In this respect, the research results that will be developed in this complex project will be large scale disseminated for all Romanian manufacturers of wind conversion electrical equipment. Taking into account that the research is developed into an consortium from which takes part a research institute, two research centers from universities and one non-governmental non-profit institution, there

may be applied the prescriptions of art.3, pt.2, paragraph c) from the law application regulations nr. 143/1999 with subsequently modifications regarding the help from the state. Considering the invoked prescriptions, the state help is not involved, that means the cost of the project will be covered 100% from the program budget.

The project diagram with activities and deadlines is presented in chart 2.

Chart 2

| NO Crt. | Phases/ Activities | Time | Necessary financial resources *) (Millions lei) | | |
|------------|---|-------------|--|-----------|-------|
| | | | Total | Total | |
| | | | | Budget | Other |
| 1 | Phase I – Study, analysis and tests on reference models A I.1- Preliminary study and technical analysis according to the european and international solutions used at the present time. A I.2- Testing on reference models A I.3- Analysis regarding european standardization | 3 luni | 180.000 | 180.000 | - |
| 2 | Phase II- Project and experimental model execution 370 W- 800 rpm, 750 W- 550 rpm, 1000 W- 1000 rpm, 1600W- 550 rpm, 3000 W- 550 rpm A II.1- Analysis of pulsatory coupling reducing methods with a clear application on the experimental model A II.2- Numerical analysis methods application (FEM) into „claw” pole structures and permanent magnets on the experimental prototype A II.3- Experimental model project 2100 W- 240 rpm A II.4- Experimental model fabrication 2100 W- 240 rpm | 4 luni | 195.000 | 195.000 | - |
| 3 | Phase III- Experimental models project 2,5 kW, 5 kW, 10 kW- 240 rpm; 7,5 kW- 220rpm A III.1- Elaboration of optimal analysis methods for the sincron generators A III.2- Numerical analysis methods application (FEM) 2D both on circular simetry structures and also saturated magnetic circuits with direct utility in sincron generators projection A III.3- Experimental models projection 3000 W- 550 rpm; 5000 W- 240 rpm; 8500 W- 170 rpm | 2.5 luni | 240.000 | 240.000 | - |
| 4 | Etapa IV- Testing on the experimental model 370 W- 800 rpm, 750 W- 550 rpm, 1000 W- 1000 rpm, 1600W- 550 rpm, 3000 W- 550 rpm A IV.1- Elaboration of references and testing methodology of the sincron generators with permanent magnets A IV.2- Tests on the experimental model | 3 luni | 150.000 | 150.000 | - |
| 5 | Etapa V- Fabrication of experimental prototypes 2,5 kW, 5 kW, 10 kW- 240 rpm; 7,5 kW- 220rpm A V.1- Manufacture of experimental prototypes | 4 luni | 200.000 | 200.000 | - |
| 6 | Phase VI- Tests on experimental models 2,5 kW, 5 kW, 10 kW- 240 rpm; 7,5 kW- 220rpm A VI.1- Tests on experimental models | 3 luni | 200.000 | 200.000 | - |
| 7 | Etapa VII- Elaboration of the law initiative regarding the fabrication, in Romania, of wind energy conversion equipments and the complementary state help diagram A VII.1- Elaboration of the law initiative regarding the fabrication, in Romania, of wind energy conversion equipments and the complementary state help diagram | 5 luni | 80.000 | 80.000 | - |
| 8 | Phase VIII- Elaboration of the developed technical project for the wind energy conversion equipments series A VIII.1- Elaboration of the developed technical project for the wind energy conversion equipments series | 4 luni | 130.000 | 130.000 | - |
| 9 | Phase IX- Large scale dissemination of the results towards all the interested parties A IX.1- Large scale dissemination | 2006 - 2008 | 50.000 | 50.000 | - |
| 10 | Etapa X– Support actions (International Fair participation (Hanovra) 2006, International Conference participation (International Conference on Electrical Machines- ICEM 2006), 2008) | 2006 - 2008 | 75.000 | 75.000 | - |
| | TOTAL VALUE OF CONTRACT (2006-2008) | | 1.500.000 | 1.500.000 | - |

7. RESULTS/ PROFITS AND DIAGRAM/CAPITALIZATION PLAN/ DISSEMINATION

The results are not obvious at the end of the research. Their implementation in Romanian electric machines fabrication needs more expenditures to cover both the additional costs of preparing the specific tools and the the additional investment costs for the final users of the motors. Acceleration in the application of the final results may be obtained by a systematical policy of authorities responsible of energy and environment protection, with institutional character, in order to press the involved parts. The total power installed, and also used, is almost 1 MW, but in 2004 wasn't installed any other wind equipment.

The results based on experimental models, manufactured and tested, as technical project development, will be disseminated on large scale to all the Romanian manufacturers, following the finance of the research from the state budget.

In case there appear, during the research, elements that need classification or protection regarding industrial property, the problems will be solved observing all the legal prescriptions.

8. TECHNICAL, ECONOMICAL AND SOCIAL IMPACT

The technical impact is highlighted by introducing by following aspects:

- necessity to develop the competitive equipments, aligned to the standards and technical condition asked for by international fabricants;
- apparition of new perspectives for manufacturing units in electrical machine domain; alignment of the works of wind conversion energy equipments according to the international law, for medium protection, revere the law for assureness in running

9. PROJECT MANAGEMENT

The management of the project will be mainly a task of the research unit (ICPE-ME) which has a long time experience in designing electrical machines. The research team is deeply specialised in this field of optimal design of electrical machines and also in the economical analysis and technological design.

It is specified that, monthly, the research team will analyse the steady state of the researches compared to the diagram of the project and discrepancies will be immediately solved. Measures will be taken as the results to be put in value as soon as possible inner the team but also in order to disseminate them.

Taking into account the coloboration between the research and execution compartments of the research team, the responsibility will be distributed depending on the stage of the research. At anytime there can be performed corrections in order to obtain the proposed results as soon as possible. The team involved in the research activities is an heterogeneous one, having specialists in electrical machines, power electronics, electromagnetic design, mechanical design, quality

engineering and technico-economical analysis.

In order to be informed regarding other manufacturers products, it has been specified, in the project's activities list, some kind of „support actions” (up to 5% from the total financing amount) representing formal participations to the international fairs (example Hanover fair) or international conferences (example „International Conference on Electrical Machines”, ICEM-2006, 2008).

10. DESCRIPTION OF REQUIRED RESOURCES FOR PROJECT EXECUTION

It is requested from the programme's budget, due to the plan of realization who contents clear phases and activities for each applicable research stage (developing the analysis, experimental models design, manufacturing and testing) a budget of 1.500.000 lei, amount that covers the material and human resources necessary for developing the analysis, experimental models design, manufacturing and testing.

As the endowments are concerned, it has to be mentioned that there are the main equipments necessary to be experimentally tested on the new designed motors taking into account the standards' prescriptions such as sources, dynamo-brakes, measuring equipments, computing equipments of ICPE-ME and of the UPB and UTCN research centers.

However, in order to improve the quality of the specific testing equipments it is necessary to take into account some new endowments to be bought from the project's budget such as data acquisition systems working on line with personal computers, oscilloscope “Tektronix” type THS 720P including additional equipments, torque transducers type “Hottinger-Baldwin” and also two computing systems for electromagnetic design including an A3 printer.