Project title:

RDI Development - Multidisciplinary Scientific and Technological Research Institute

UNIUNEA EUROPEANĂ

GUVERNUL ROMÂNIEI

Instrumente Structurale 2001 - 2013

UNIVERSITATEA VALAHIA TÂRGOVIȘTE

www.valahia.ro

Brief description

POS-CCE ID 916 / SMIS 14687

On 2010 September 28th, Valahia University of Targoviste signed with the National Authority for Scientific Research the financing contract. The project was selected in competition POSCCE-A2-O2.2.1-2009-4, has a total value of 13.630.435 Euro and will be developed in 36 months. The project's objective is to construct in the universities campus a new building for the research institute with 20 laboratories (36 new spaces) and to endow it with research infrastructure of the highest level in the field of renewable energies, products and innovative processes. The institute's activity will encompass the development of new materials, devices and systems with applicability in renewable energy generation and building integration in regard to energy efficiency and reduction of consumption, raw materials usage and combustibles. The project will increase the R&D potential of the 3 South-Muntenia Region from Romania and will strengthen the competitiveness of Romanian research potential at European level.

Project title:
RDI DEVELOPMENT - MULTIDISCIPLINARY SCIENTIFIC AND TECHNOLOGIC RESEARCH INSTITUTE
Acronym: ICSTM
Timeframe: 36 months
Project co-financed by the European Regional Development Found
Project total value: 13.630.435 Euro
Eligible value of the project: 11.050.763 Euro
Project thematic area: 3. Energy
UNESCO Code of the project: 3322.05 Renewable energy sources
Number of project call session: POSCCE-A2-O2.2.1-2009-4
Project ID: 916
SMIS code: 14687

The objective of the project is the developing of the Multidisciplinary Scientific and Technologic Research Institute (ICSTM), to increase the research-development R&D capacity in the South-Muntenia Region and at national level, for the competitiveness of Romanian scientific research at European level.
The project proposes the development of the R&D infrastructure, providing the framework, tools and the necessary resources for research, consultancy, services and training of highly qualified human resources, to strengthen research partnerships between education and industry in strategic areas of knowledge transfer to the economic environment.
The development of the Institute and its assertion as an entity of excellence implies the occurrence of a dynamic environment for training of young peoples and researchers as well as attracting valuable researchers from Romania and abroad.

1. The project presents three major components:
1.1. Construction of a new building for R&D
1.2. Equipment procurement of material and immaterial assets for R&D
1.3. Dissemination, at wide national and international scale of UVT R&D capacity achieved through the project

1.1. Building construction

Footprint: Sc = 2220m^2; Usable space: Sd = 6720m^2

The building is composed by 4 areas functionally and volumetrically differentiated as:

a) ***Laboratory area*** (over 80% from the entire space) – those are especially modulated to fulfill the optimal technical conditions for research activities.

b) ***Administrative area*** – for R&D strategy conception, technological transfer and intellectual property, technical and technological documentation, for PhD students training, IT&C, documentation and dissemination. It only represents 18%.

c) ***Amphitheatre*** (150 places) – for research results dissemination, congresses, workshops, national and international conferences;

d) ***Terrace roof*** – assures the support and necessary facilities for 3 high-tech technological platforms. It provides stairway or elevator access on the terrace for easy transportation of research prototypes to be tested in real life conditions. It will also have installed 3 renewable energy generators (photovoltaic, thermo-solar and wind turbines).

The infrastructure encompasses: research laboratories (20); research activity auxiliary rooms (8), design-modeling-simulation laboratories (1); laboratories for training PhD students (1); amphitheatre (1); dissemination rooms (2); technological transfer (1); research strategies and scientific research Programs department (1); IT&C department (1); administration rooms (5); functional roof (solar and thermo solar photovoltaic panels, wind power generators) and functional annexes (6 in the basement). The building also houses 2 white rooms (1000 class purity, with the possibility of working under laminar flow hoods of class 100).

The building's main facilities:

- 20 R&D laboratories in 36 rooms with 8 technical auxiliaries,
- 3 experimental research platforms for renewable energy sources;
- 5 technological laboratories;
- 7 administrative offices;
- 4 results dissemination spaces (amphitheatre, technological transfer, international relations, information center);
- 6 functional annexes (in the basement).

The new building has a dual purpose:

- Dedicated platform for research and development with advanced facilities and high-tech installations that can be used in a multidisciplinary environment in a single optimized place;
- Study object that incorporates building integrated renewable energies generators (last 2 floors integrating, more then half from the southern façade, semi-transparent PV modules) as well as a building management system for efficient energy consumption and specific processes optimization.

List of new research laboratories, organized by research directions:

Renewable Energy Resources (RES)

L01 - Cells and photovoltaic modules
L02 - Thermo-electric and solar thermal generators
L03 - Micro-hydro-turbine and micro-wind generators
L04 - Biofuels - Design
L05 - Modeling and Simulation in RES
L06 - Materials used in energy conversion
L07 - Storage of renewable energy
L08 - Electric and electronic systems used in RES
L09 - Mechanical and automation systems used in RES

Sustainable development using RES – Environmental impact

L10 - Physical and structural characterization of materials
L11 - Chemical and biological characterization of materials
L12 - Environmental quality monitoring
L13 - Unconventional technologies used for environment protection

Renewable energy production and distribution

L14 - Building integration of RES power generators
L15 - Energy conversion in specific networks
L16 - Autonomous systems and energy management
L17 - Energy insurance and efficiency
L18 - Energy management systems for distributed intelligent networks
L19 - Software technologies for design of RES systems
L20 - Management and economic-financial analysis of power systems

1.2. R&D equipments

The equipments proposed to be procured in the project are multiple and diversified. Each equipment has a well mentioned role in a research field or in more fields. There are equipments without which we cannot make advanced fundamental or applicative research, 10 of them have a value larger than 100.000 Euros/equipment, being considered strategic equipments, as follows:

Experimental photovoltaic platform:

Active area: over 250m^2, Power input: ~25KWp, Composed of PV modules with cells from the following technologies: Ribbon Si, amorphous hydrogenated Si, monocrystalline-Si; copper-indium-gallium selenide, flexible PV modules, transparent and served by 8 inverters with powers between 2.5 and 9.3 kW; two platforms for positioning, one of them dedicated Large Solar Array type.

Experimental wind power platform:

Different technology and design wind power turbines of around 25KWp: hybrid wind turbine; small wind turbines, conventional wind turbines, vertical wind turbines, MagLev wind turbine al served by inverters with powers between 1.5 and 7 kW; installed on a site simulations with horizontal and vertical positions on different axes to obtain an optimal wind in regard to zonal currents.

Experimental thermo-solar platform:

Active area: 250m2; Capacity 10,000 liters consisting of solar-type plan; with thermosyphon; exhaust and vacuum tube; part of the plant served with heat exchangers of over 1,000 liters capacity.

System for development and prototyping of PV modules:

Manual high precision manufacturing line for PV modules. Facilities: raw positioning and calibration (sorting, inductive soldering, measuring and video inspection), aligning and assembly, lamination and protective termo-plastic EVA coating, junction bounding, framing, test and verification of opto-electronic and insulation properties.

Inductively coupled plasma mass spectroscopy (ICP-MS):

Frequency generator for plasma - 27.12 MHz; supply with Ar, plasma temperature around 10000 K, ionic mass spectrometer with four poles, field measurement from Li to U, CID solid detector that can measure all elements in the same time,

simultaneous measurements of the entire elemental mass spectrum, the rate of displaying the integrated mass spectrum is 50 spectra / sec, capacity of processed samples to determine the entire range of masses;
Multi-pass analysis, the sampling rate of 30,000 full spectra per second, simultaneous internal calibration;
Electric vacuum deposition and dielectric layers by Sputtering:
UHF vacuum 10^{-8} torr, turbo molecular pump, metallic or dielectric layer deposition, 6 sources for application; precision layer by 20 nm, cooled by liquid nitrogen, automatic control of the deposit;
Surface electron microscope (SEM) equipped with focused ion beam (FIB):
Ultra high vacuum 10^{-8} torr; 0.8nm to 30 KeV resolution; 3nm - 1KeV; 200 V and 30 KV acceleration tension, probe current from 0,5nA to 2mA; optical column with 2 ionic pumps different for micro/nano machining and ion flux lithography.
Atomic force microscope (AFM):
Measurement modes: contact, taping or proximity, sensitivity less than 2nm; measuring area more than 5µm x 5µm, software suitable for 2D and 3D; fine movement on the X, Y and Z; laser for positioning and scanning.
Laser ablation:
Selectable wavelength: 1060nm, 532 nm or 355 nm; pumping with laser power diode. X-Y movement up to 450 mm and 150 mm to Z axis; The laser pulse is in the ns domain; granite table.
Cells and modules characterization test bench:
Light source: xenon, AM 1.5 spectra, adjustable light intensity: 200 W/m^2 - 1100 W/m^2, thermo controllable chuck, vacuum holder, 4 magneto-electric testers x-y positioning, I-V test station, measuring period 7-14 ms.

The project also encompasses 2 white rooms for high-tech processes: 75m^2 class 100 for nanostructures and 75 m^2 class 1000 bacteriological sterile for biologic materials. The chambers are endowed with laminar flow hoods, HEPA filters 100 class, operator access SAS.

2. The project main expected results from it's development are:

- Development of the R&D infrastructure in a modern state-of-the-art manner, integrated in an universitary campus, unique at national level, axed on a scientific and technological domain of high interest, providing a 6720 m^2 usable area needed for establishing the framework, instruments and the resources needed in the research, services, consultancy and training activities.
- Achieving a dynamic training framework for the young by and through research activities, attracting valuable researchers from Romania as well as from abroad to assure a competitive environment for scientific research at the European standards level.
- Consolidation of partnerships between research, education and industry in the strategic field of energy, for lowering the technical and production gaps, lowering costs, alignment to the principles and standards of sustainable and durable development to allow the growth of competitiveness in the business environment; increasing the cooperation in the field of innovation on targets requested by the market and the regional development strategy.
- Training young engineers and researchers in the high interest field of process automation and advanced systems for production and high precision measurements;
- Increasing the visibility of Romanian science through publication of high impact and by involving into international projects in which the Romanian partner to have significant contribution;
- Attracting the creative potential from other R&D units whom does not have at their disposal modern equipments laid-out in a manner that allows complex research activities;
- Involvement of the institute into national and international prioritary programs;
- Involvement in national research development and innovation projects;
- Development of projects in partnerships with SMS and other potential industrial partners;
- Consultancy and assistance services for Romanian companies which possesses high-tech process equipments;
- Development of training courses for specialists improvement in different fields of activity;
- Realization of special orders for research brought by different partners (high precision manufacturing of parts which overcome the production possibilities of regional developers, in small scale or small series manufacturing/prototyping).

Direct beneficiaries:

- The principal class of beneficiaries of the project results is represented by the 77 peoples that will have new jobs in RD, after the end of financing, in operation phase. The profile of this jobs is described in the chapter "Institutional sustenability" of the present request for financing.
- The 2nd class of beneficiaries is represented by the PhD and post-PhD students. Is estimate that will be employee for a limited period 10 post-PhD students. Also, for 16 PhD students will be assured jobs, depending to the research contracts. So, the PhD students that will be employee can recover the registration fees.
- The 3rd class of beneficiaries is represented by the specialists from the production, the employee of the economic agents. ICSTM will offer the posibility to organize continuing education courses. In this sense have already expressed the interest 78 engineers and 35 technicians for a training course on modern equipment to ensure reliability.
- The 4th class of beneficiaries is represented by the economic agents from the region 3, South Muntenia and other. Has been identified 6 merchants of thermosolar and photovoltaic products, in Targoviste, which can received specialized consulting. Also, the material base of ICSTM will be the starting point in a feature collaboration with different commercial society. In this sense 23 commercial society have already expressed the interest, including: S.C. Mechel Targoviste S.A., S.C. Cromsteel S.A. Targoviste, S.C. Otel-Inox S.A. Targoviste, Erdemir Targoviste, UPET Targoviste and other.
- The 5th class of beneficiaries is represented by the traditional collaborators of UVT, universities and research institutes, which will win by the increase the CDI potential of the partner and will benefit by the technological facilities at the finalization of the ICSTM.
- The 6th class of beneficiaries is represented by the renowned companies from the renewable energy area with which the ICSTM will colaborate for development of the institute and after the end of implementation.
- The 7th class of directly beneficiaries is the community which will receive informations about the environmental protection, renewable energies and energetic eficiency as a result of the dissemination policy proposed in this project.
- The 8th class of beneficiaries can be represented by the potential investors in the renewable energies area which will benefit, through the dissemination policy and the services offered by the new institute, by the necessary information for the development of a investment strategy in this domain.

Potential beneficiaries

Indirectly beneficiaries:

- The international collaborators, existing and potentials, which will benefit by the results in scientific and technological research;
- Producers and merchants from the renewable energies area from Romania which will have available the services of this institute for assistance and specialty consulting;
- Producers or merchants of technological solutions from the green energy area which intends to development a research department, will benefit by the consulting and specialized training;
- The students of UVT which will benefit by the educational visits will understand the physical, mechanical and technological phenomens by the practical applications;
- Teachers and researchers from Romania and abroad that will benefit from a credible partner in the exchange of know-how specific research areas of the institute;
- The community from the region 3 South Muntenia, whose standard of living will increase and will receive a lesser rate of unemployment by boosting economic means will be achieved with new technical collaboration between the institute and firms applied in the region;
- The peoples from the region 3 South Muntenia which will be employee by the companies that will collaborate with the institute;
- The local authorities will be less confronted with unemployment and collect more money from local taxes and taxes paid by ICSTM;
- The residents from the vicinity of the institute who will benefit from immediate environmental effects of the lack of pollution by noxious gas;
- Labor will be involved in carrying out the institute.

The development of this project will allow to:

- Attract at least 12 researchers foreigner in the first 2 years after implementation, to develop a RD activity in ICSTM, in the first year after the project;
- Attracting in the research activities of ICSTM a number of 16 PhD students and 10 post-PhD;
- Increase the R&D international collaborations of UVT which are already established with research groups in multiple European networks.

Sector Operational Program the Increase in the Economic Competitiveness
"Invest for your future"

Priority axis: AP.2. Competitiveness via research, technological development or innovation
Intervention field: D.2.2. „ Investments in CDI infrastructure and development of administrative capability"
Operation: O.2.2.1. Developing the available C-D infrastructure and creating a new C-D infrastructure (labs, research centres)

Project title: RDI DEVELOPMENT - MULTIDISCIPLINARY SCIENTIFIC AND TECHNOLOGICAL RESEARCH INSTITUTE / Acronym ICSTM

Edited by Valahia University of Targoviste - Romania
03.11.2010