National Research and Development Institute for Industrial Ecology – INCDE ECOIND

Self-assessment Report

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Summary

This is the **Self-assessment report** of *Institutul National de Cercetare – Dezvoltare pentru Ecologie Industriala* (National Institute of Research and Development for Industrial Ecology) – *INCD ECOIND* realized in the context of the institutional evaluation process required for Romanian research units or institutions to gain access to public institutional research funds[1]. For INCD ECOIND the process has been initiated (officially) – and will be coordinated - by the Consultative Council for Research Development and Innovation at the request of National Authority for Scientific Research on 16.11.2011.

The structure of this self-assessment report has been established by law[2].

The report begins with a **short presentation of the existing structures of the institute** (management, scientific councils, **departments, research labs or groups**, technical and auxiliary support – *Chapter 1).*

The next *chapter (the 2nd*) presents the **status of INCD ECOIND, its activity and evolution in the previous 4 years (2007-2011**) mainly from the scientific point of view (major achievement, investments, human resources development, visibility and communication, technology transfer activities, publication initiatives).

The *3rd chapter* is focused on the **activity of the research teams** of INCD ECOIND, within the same time period (2007-2011), mainly presenting the important achievements, dynamic of research directions / subjects, interdisciplinary character, human resources evolution, infrastructure, other relevant scientific aspects.

At the end (*chapter 4*), but not insignificant, is presented a **representative project** of INCD ECOIND by its entire life cycle (conception, development, execution and exploitation) considered as representative for the performance, visibility and socio-economic impact of the assessed institute.

1. Administrative structure diagram

- *General aspects*

The institute is carrying its activity in the headquarters located in Bucharest and two subsidiaries without juridical personality in Timisoara and Rm. Valcea.

The main activity domain is **advanced, applied research, technological development and services** in the field of **environmental protection for pollution control, assessment, prevention, reduction and abatement**.

In this context the organizational structure comprises environmental research departments, laboratories, compartments that collaborate for completion of research projects.

The support financial-accounting, technical administrative departments working exclusively for research projects are also included within the organizational structure, together with other administrative personnel.

- *Issues that determined updates on organizational structure, within the analysed period:*

- Diversification of activity domain in response to the needs of economic environment
- Regulations specific to research activities (related to classified information, internal control);
- The SOP ICE project (2009-2012), performed by the institute, which meant development of new research directions and related research laboratories, endowed with modern state of art equipments.

The institute was established in 1978 as the Research and Design Institute for Wastewater Treatment (ICPEAR) with headquarters in Bucharest and a subsidiary in Timisoara, in 1982 was established Rm.Valcea subsidiary. Activity object: elaboration of technologies and design of installations for treatment of wastewater discharges from chemical and petrochemical industries. The practical aspects of research activities, the response to the international trends in the field determined the extension and diversification of institute's research domain:

- Treatment of wastewater discharges from other industrial sectors (90')

[1] Government Decision 1062/19.11.2011
[2] ibidem

- Urban wastewater (after 1990)
- Air (1995) and soil (1997) pollution
- Assessment of pollution status, environmental impact and ecological risk induced by industrial activities (1998)
- Design and implementation of quality and environmental management systems (2000)
- Support for introduction of sustainable development principles into industrial units: analysis of technological processes, cleaner production assessment, eco-efficiency, assessment of environmental costs and environmental management accounting introduction of sustainable development paradigm within the strategic development objectives of enterprises (after 2000)
- Training courses (after 1990), evaluation of competences in the environmental domain (2010)

These adaptations / developments on research directions and services to the market needs and European trends in the field concluded to the actual ***activity domain: environmental pollution control (water, air, soil, sediments, waste, sludge), environmental pollution assessments, assessment of environmental impact and ecological risk, reduction and abatement of environmental pollution through environmental technologies (water, industrial and urban wastewater, waste, sludge, soil), quality and environmental management systems, personnel training and evaluation of competences in the environmental field.*** On these directions the system of departments, laboratories and compartments is structured. Thus, the institute evolved from a research institute dedicated to treatment of wastewater from chemical and petrochemical industries to a national institute that approaches all environmental issues of industrial units, recognized at national level and with a more active presence in international partnerships. Similar to the development its organizational structure has been adapted.

- *The present organizational structure is approved by the coordinating ministry MECMA through Ministerial Order 3098/29.11.2011* (see annex)

- **Top management of the institute**

The collective top management structures are represented by:

- **The Board of Directors**:

Formed from 7 members: the General Manager and the President of Scientific Council and 5 representatives from various ministries: coordinating ministry MECMA (2), ANCS (1), MFP (1), MMFPS (1).
It is responsible for analysis and approval of institutes' objectives on main activity and management domains: research (strategy, panning), economic-financial (income and expense budget, financial documents, economic performance), infrastructure (yearly plans), personnel (organizational structure, personnel structure, personnel training), and quality (implemented systems and control of activities).

- **Scientific Council**:

Formed from 15 members: 13 well known and recognised researchers from the institute and 2 academic professors.
It is responsible for prosing, analysing, advising, organising and management of activities directly linked with research works: research and development strategies and plans, research policy, new research directions, training of research personnel, national and international partnerships, dissemination and valorification of the results, scientific events.

- **Steering Committee**:

Formed from 5 members: General Manager, Scientific Director and Heads of compartments from organizational structure.
It is responsible for setting up concrete actions and is assuring the operational management in order to accomplish the objectives proposed by the General Manager, approved by the Board of Directors and Scientific Council.

- **The day by day activity in the institute** is managed by the General Manager, specific research activities are coordinated by the Scientific Manager, and economic-financial activity is lead by the Chief Accountant.

➢ *The research activity* is coordinated by the Scientific Manager and is organised on Departments / laboratories and compartments dedicated to the main research activities, technological development and services provided by the institute: environmental control, assessment, technologies and management systems. Thereby the activities are performed in 6 research entities in Bucharest, organised on 3 departments, 3 laboratories and 1 compartment and 2 subsidiaries in Timisoara and Rm. Valcea. In the conception of present Self-assessment Report those research entities are designed as research teams on which structures the report is constructed, on institute's research domains.

In this context, the **research teams** mentioned within the report are also presented:

- **Pollution Control Department (teams E1-E3)**

Domain: analytical research for development of methods, techniques, methodologies, standards for identification and control of pollutants in water, air, soil, waste, sludge, sediments, and also services to the economic environment.
Main specialisations: chemists, biologists, ecologists.
Depending on analysis categories and investigated environmental media, the department's activity is structured in 3 research laboratories:

- **Water, Soil, Waste Pollution Control Laboratory - Team E1**

Domain: Research works and services using physical-chemical methods for determination of pollutants from surface, underground, drinking, sparkling, water, industrial and municipal wastewater, sludge, various waste types, surface water sediments.

Personnel: 15 occupied workplaces (11 high studies, from which 7 attested + 4 technicians)
2 vacant workplaces

- **Bioassays – Biological Analysis Laboratory - Team E2**

Domain: Research works, studies and services using specific methods: biological, micro-biological, eco-toxicological etc. determination of specific pollution and toxicity and assessment of potential risk upon environments' health.

Personnel: 10 occupied workplaces (7 high studies, from which 5 attested + 3 technicians)
1 vacant workplace

- **Air Pollution Control Laboratory - Team E3**

Domain: Research on methods, specific techniques for determination of air pollution (emissions/imissions) and assessment of pollution status, impact of some activities (dispersion models, noise maps, greenhouse effect gases) and air pollution monitoring services.

Personnel: 13 occupied workplaces (10 high studies, from which 9 attested + 3 technicians)

- **Environmental Pollution Assessment & Monitoring Department- Team E4**

Domain: Assessment of pollution status through field and laboratory investigations (impact, ecological risk) determined by economic activities, especially the industrial ones.

Personnel: 14 occupied workplaces (10 high studies + 4 technicians)

- **Environmental Technologies and Technology Transfer Department - Team E5**

Domain: Research and technological development for elaboration of physical – chemical and/or biological treatment technologies for water, industrial and municipal wastewater, sludge processing, waste treatment, by-products recovery, soil recovery; technological transfer of technological results: implementation of new technologies, optimization of existing technologies, technical assistance for technologies' implementation.

Personnel: 22 occupied workplaces (16 high studies from which 10 attested and 6 technicians)

- **Management Systems Compartment - Team E6**

Domain: Design and implementation of quality, environmental, health and occupational safety, food safety management systems, accredited professional courses.

Personnel: 4 occupied workplaces (3 high studies, attested researchers + 1 technician)

- **Timisoara Subsidiary: Control, Assessment, Environmental Technologies - Team E7**

Domain: Institute's replica for western part of the country and collaboration with Hungary, Serbia.

Personnel: 8 occupied workplaces (6 high studies, from which 5 attested researchers + 2 technicians), 1 vacant workplace

- **Rm. Valcea Subsidiary: Environmental Control and Pollution Assessment - Team E8**

Domain: Pollution control and assessment services in Oltenia area.
Research activities are taken over by Bucharest laboratories.

Personnel: 6 occupied workplaces (3 attested researchers + 3 technicians)

- **Centre for Evaluation of Professional Competences:**

- It is developed in the frame of an SOP HRD project, to be completed in 2012
- It capitalized the institute experience in human resources training, on various environmental specialties, using the institute's logistics for assessment activities.
- It is intended to be developed as an spin-off depending on market needs and available financial resources.

The Financial – Accounting and Administrative – Technical support departments are presented further on.

- **Financial – Accounting Department**

- It's coordinated by the Chief Accountant
- It comprises specific compartments: Accounting – Financial, Economic Analyses, Budget, Public procurement, Supply
- It has technical non-administrative personnel working for research projects' financial reports development and monitoring and personnel specialised on accounting – financial activities.

Personnel: 8 occupied workplaces (3 high education grade + 5 secondary education grade; 3 technical non-administrative personnel)

- **Technical Administrative Department**

- It comprises specific compartments: Marketing, Planning - Technical (monitoring, registering contracting activities, technical interface with clients), IT – printing and editing, Human resources, Administrative and Maintenance workshop (administration of the building, exploitation of utilities supply installations, wastewater treatment and gas treatment installations), transport (sampling, samples and equipments transport), work safety, fire security services.
- It has personnel of various specialities.

Part of the personnel is involved directly in research projects (Planning – Technical, Transport) as technical non-administrative personnel and the rest has administrative responsibilities.

Personnel: 26 occupied workplaces (9 high education grade + 17 secondary education grade; 6 technical non-administrative personnel)

- **The organizational structure** includes compartments specific to economic unit's activity, some of them developed as a result of various regulations issued within the analyzed period: Juridical office, Information and public relations. Classified documents, Internal public audit, Internal control.

Personnel: 3 occupied workplaces (with high studies).

- *Total institute's personnel (30.11.2011): 129*

  from which: high studies: 83
  medium studies: 46

  Research – development personnel: 94
  - 68 faculty studies
  - 55 attested
  - 26 technicians

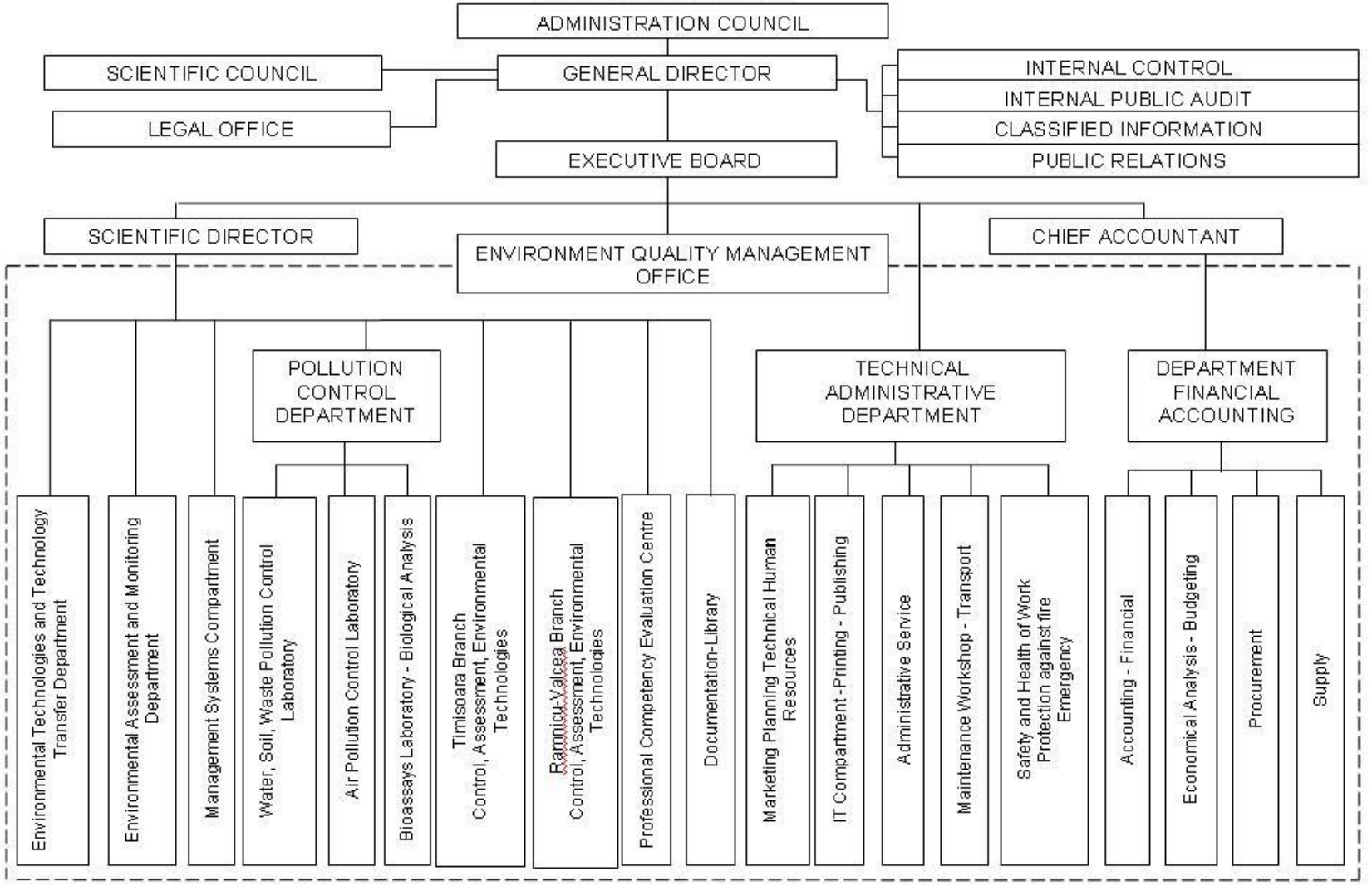
  Non-administrative technical personnel: 9
  Administrative personnel: 26

- *Whole institute activity is carried in accordance with integrated quality (SR EN ISO 9001) – environmental (SR EN ISO 14001) management system implemented within the institute. The system's maintenance is assured by the Quality – Environmental Management System Office.*
  Laboratories from Pollution Control Department are accredited for laboratory tests in accordance with SR EN ISO/IEC 17025.

  Implementation of these systems determined procedures of all management and execution activities, together with the increase of management efficiency and improvement of research environment.
  Thus are assured the traceability of activities and documents, decisions' transparency and assessments of laboratories', personnel, collaboration between research sector and administrative – technical support.
  An Ethic and Professional Behaviour Commission is functioning at institute's level.

NATIONAL RESEARCH AND DEVELOPMENT INSTITUTE
FOR INDUSTRIAL ECOLOGY - ECOIND

ORGANIZATIONAL CHART



2. General activity report of the institute

2.1. Brief history regarding the evolution of research domain

- In order to better know us, a short foray in our institutional development until 2007 is needed.
- After 1975, started to appear professionals groups with interest in environmental research within chemical research entities, institutes and universities: Institute for Chemical Research Bucharest and University "Politehnica" Timisoara – Inorganic Chemistry and Water Technology Chair.
  The initiative to organize environmental research within an institute belongs to acad. Vasile Cocheci, the father of water technology specialization within chemical engineering high education and related research activities.
- 1978 – establishment of Research and Design Institute for Wastewater Treatment - ICPEAR, with headquarters in Bucharest and a subsidiary in Timisoara (research group integrated into University). Coordinator: The Ministry of Chemical Industry (MICh); 1982 Rm Valcea subsidiary – for pollution control needs on Valcea chemical platform; Activity object: elaboration of technologies and design of installations for treatment of wastewater discharges from chemical and petrochemical industries
- After 1980, continuous diversification of research directions and services responding to the trends of environmental research and to the market's requirements

Actual main activity domains:: *environmental pollution control (water, soil, air, sludge, waste, sediments); environmental pollution assessment (impact, ecological risk); reduction and abatement of environmental pollution via environmental technologies (water, industrial and urban wastewater, waste, sludge, soil); quality – environmental management systems, personnel training and assessment of environmental competences.*

- In the period 1995-2000, an audit of Romanian research system took place, initiated by National Authority for Scientific Research, in the aim to re-organize and develop the research system in accordance with European requirements and tendencies.
  The institute participated within this action that was considered an external measurement instrument for the viability of its research domain and assessment of its development perspective.
  The audit pointed put the multi-disciplinarily character of the research domain and its unique profile on systemic approach of environmental issues generated by economic activities and especially industrial ones.
  After completing the specific procedures, institute was *accredited as National Research and Development Institute for Industrial Ecology - ECOIND in 1999 and subsequently re-accredited*.
  Separated, in 1990-1991, by its design component, the institute initiated technological development activities for study of process engineering and elaboration of technical projects for the solutions developed within the research component.
  An important moment for institute's evolution was the decision to apply in a project financed from structural funds in a competition held in 2008.
  Three years project (2009-2012) within the operational programme SOP ICE, priority axis A2 – increase of economic competitiveness through research, development and innovation and is scheduled to be finalized in 29.02.2012.
  The project objective is to *extend and diversify research area through: development of new research directions, development of a new research infrastructure and endowment of laboratories with modern equipments, apparatus and installations in the aim to extend and diversify researches in the field of industrial ecology through development of new research directions*

2.2. The general technical – scientific status of the institute and its evolution within the analyzed period

2.2.1. General considerations regarding the analyzed period

- In the period 2007-2011 European research was involved in the achievement of Lisbon strategy objectives regarding the increase of economic competitiveness through research, improvement of innovation capacity within the competition at the world level.
  At national level, The Research – Development – Innovation Strategy of Romania 2007-2013 and National RDI Plan 2007-2013 are considering environmental research as a theme of national interest.
- Within the analyzed period the projects from RDI National Plan I are finalized with its thematic programmes, from which MENER programme is assuring the environmental research financing.. Projects from Research of Excellence Programme (CEEX) are finalized, in which innovative, inter-disciplinary researches were developed and RDI National Plan II (PN II) is launched with the Partnership Programme that sustains applied and technological development researches for the increase of economic competitiveness.
- The level of budgetary financing increased in the period 2007-2008, but in the period 2009-2011 economic – financial crisis affected research investments, in 2009-2010 there were not initiated competitions dedicated to applied research and the competition from 2011 in Partnerships Programme will produce effects in 2012.

- That determined an orientation of institute's research to other extra budgetary sources. A constant source of financing was constituted by direct contracts with economic environment. Thereby the concern for valuing new research directions and services oriented to the concrete needs of economic units.
  Another used resource was the extension of collaboration with regional and international external programmes on environmental themes.

The objectives are creation and development of new partnerships within the European research area aiming to develop new, innovative, excellence direction for environmental research.

Mission: INCD ECOIND is responding through environmental research works to the needs of economic environment and themes from national and international programmes, European tendencies in the field.

Profile: Research – development and services for integrated pollution control, environmental impact and risk assessment, environmental technologies for reduction and abatement of industrial pollution

To whom we address: industrial units, local authorities who are facing environmental problems

Competitive advantages (vs. other research institutes and centres): Response to all environmental issues of industrial units for their economic sustainable development; experience in the most diverse and complex pollution control and environmental technologies problems; laboratory endowment; experienced and competent personnel; presence well known in the market and a portfolio of clients in continuous growth.

2.2.2. The evolution of institute's research activity within the analyzed period

It is presented an evolution of the 5 years included within the analyzed period for the main indicators that characterizes the institute's research activity:

- **Turnover on public/private, international / national sources** (table 1)

Variation of turnover per year and funding sources Table 1

years	2007	2008	2009	2010	2011
Turnover (lei)	**10,230,299**	**12,252,645**	**11,277,624**	**11,634,911**	**11,620,000**
public funds (lei)	5,823,203	7,950,265	4,690,475	5,643,976	6,400,000
national source	5,650,084	7,862,785	4,524,120	4,136,724	4,900,000
international source	173,119	87,480	166,355	1,507,252	1,500,000
private funds (lei)	4,407,096	4,302,380	6,587,149	5,990,935	5,220,000
national source	4,296,052	4,260,827	6,587,149	5,914,493	5,160,000
international source	111,044	41,553	0	76,442	60,000

Institute's turnover, exclusively resulted from environmental research and services, achieved a maximum value in 2008, when public national financing was above 63%. In the following years, the institute builds an austerity budget with a relatively constant turnover, in which the rates of national extra budgetary and private funds are increasing above 50%, and the financing from international public sources reached 10-15%, not-satisfactory percentage, but the valorification of international projects constitutes a strategic objective of the institute.

- **Projects** managed as project / consortium coordinator or partner, **within national / international programmes**, from private or public funds, on values categories (table 2);

Projects accomplished per years, funding sources and values Table 2

years	2007	2008	2009	2010	2011
Total projects (number)	21	24	14	20	48
as coordinator	18	15	8	11	39
as partner	3	9	6	9	9
for national projects					
projects with value below 125.000 euro	*15*	*16*	*9*	*12*	*30*

projects with value 125.000 - 500.000 euro	*3*	*6*	*1*	*3*	*8*
projects with value 500.000 - 1.000.000 euro	*1*				*1*
projects with value over 1.000.000 euro					
for international projects					
projects with value below 125.000 euro	*2*	*2*	*3*	*4*	*5*
projects with value 125.000- 500.000 euro				*1*	*3*
projects with value 500.000 - 1.000.000 euro					*1*
projects with value over 1.000.000 euro			*1*		

The evolution of projects' number is following the turnover tendencies: a constant with a relatively large number of projects (45) in period 2007-2008, financed from public national funds, an adaptation to crisis conditions in 2009-2011 with an yearly increase of projects' number (48 in 2011) especially for those financed from private (30 in 2011), and external funds (9 in 2011).

The projects values, within the analyzed period, presented a constant increased of values above 125.000 euro for national and for international projects. Though, after 2009, the values of projects financed from private funds are lower compared with accomplished objectives, due to economic-financial crises conditions and market competition. Within international projects the values are significantly lower than those from national partnerships in which the institute capacity is well known.

The institute is proposing and carrying projects as coordinator; those represented more than 70% from the total. All direct projects with economic units are coordinated by the institute, and also a large part of the projects financed from public national funds; as for international projects the institute is in the most of the cases only partner within consortiums.

- **Research results**, those with innovative signification (patents, articles, communications, books, brochures) and application potential (technologies, models, products, studies, services) (Table 3).

Research results Table 3

years	**2007**	**2008**	**2009**	**2010**	**2011**
Project results	**176**	**229**	**219**	**232**	**262**
technologies	14	14	7	9	8
models	11	12	12	12	12
services	91	115	135	140	175
products	21	34	19	25	17
studies	39	53	42	43	46
patents	0	1	4	3	4
Articles	11	23	18	27	31
articles ISI with AIS	4	8	6	6	5
articles ISI without AIS	5	10	8	10	20
other publications	2	5	4	11	6
Communications	57	32	66	35	61
communications in extenso	24	11	55	7	52
communications in abstract	30	16	10	26	8
communications on CD	3	5	1	2	1
Books, chapters of books	2	3	1	5	7
Brochures	4	8	1	2	3

The research works carried has an important applied character, the projects results being: ***technologies, products, models, studies or services.*** The technologies and products must be emphasized, their number being almost the same in the period 2009-2011 (85) compared with 2007-2008 (73), even if was a reduction of financing for research activities. The orientation to concrete needs of economic environment has led to a significant increase of the studies and services, mainly after 2009. Original results were *patented, published (articles, books, brochures) and communicated,* it should be stressed and increase during the last 3 years of all scientific results categories. Participations to scientific events and exhibits for presenting and promoting of our results benefits from a

continuous attention, and are used for checking the level and utility of institute's research and for partnerships development with academic and economic media. The scientific potential of the personnel, the endowment conditions created to sustain the research works, is calling for an increase of scientific results in the form of patents and articles in the ISI quoted journals.

Infrastructure development

Carrying environmental research works with an experimental character is asking for an adequate technical and logistic support.

The attention to this domain was a constant and is presented for the analyzed period in terms of number of acquisitions with values above 100.000 Euro and/or relevant and invested values (Table 4).

Evolution of acquisition (thousands of euros and number) Table 4

Date of acquisition (year)	Value of acquisition (thousands of euros)	Total acquisitions (number)	No. of Main acquisitions (value above 100 thousands euros and/or relevance)
y 2001-2006	492.968	**21**	2
y 2007	498.834	**11**	3
y 2008	353.350	**11**	3
y 2009	290.761	**9**	2
y 2010	312.395	**10**	3
y 2011	5.065.960	**20**	9
Total	**7.014.268**	**82**	**22**

- Until 2008, there were available programmes dedicated to infrastructure development, accessed by the institute that invested 350-500 thousands euro per year;
- In period 2009-2011 the institute used the opportunity of Capacities programme financed from structural funds and developed an SOP IEC project. A new research infrastructure was build (4.245.100 EUR) and the endowment with equipments and logistics for research labs and increase of institutional capacity (2.883.180 EUR) was upgraded.
- From the investments in equipments more than 25% are equipments with values above 100.000 Euro, relevant from the performance and complexity point of view.
- For field research works and services were procured 2 auto-laboratories endowed with specific sampling and analyses equipments for water, soil and respectively air.

Human resources

The institute is permanently investing in personnel training and attestation, in an adequate recruitment policy, in motivation for personnel stabilization and fidelity. The offered research conditions on various themes, specializations, the modern equipments, are representing attractiveness issues for those that want to follow a career in the field. The evolution within the analyzed period of personnel number, attested personnel and efforts for the continuous training of the personnel are presented below (Tab. 5,6)

Staff Table 5

years	**2007**	**2008**	**2009**	**2010**	**2011**
Total staff (number)	135	139	135	129	129
no of researchers[(1)]	59	57	54	55	55
no of non-researchers[(2)]	76	82	81	74	74
with high education grade (for non-researchers)	18	25	24	24	27
total no of PhD	7	7	9	11	14
full time	7	7	9	11	14
part time (collaboration)	0	0	0	0	0

Notes:

(1) Attested Researchers and Technological Development Engineers

(2) Non-researchers comprises: assistant researchers, laboratory technicians, technical and non-technical administrative personnel

Personnel training Table 6

years	2007	2008	2009	2010	2011
Total travels abroad (number)	25	23	23	22	21
at project meetings	8	10	11	17	15
for new opportunities (projects, contracts)	1	1	1	1	2
at events	16	12	11	4	4
Staff trained (outside institute) (number)	20	28	25	18	27
participating	12	25	22	13	18
graduating	8	3	3	5	9

Based on these data the following conclusions regarding the personnel number and quality must be formulated:

- In an easy decrease after 2008, when conditions from human resources market were negative, the institute reached a relative constant number of personnel (around 130), which can be considered the needed critical mass;
- Number of attested researchers is practically constant in the last 3 years, the retirements being compensated by the attesting of young research personnel and new recruitments;
- The number of PhD and PhD students increased during the analyzed period;
- The institute is investing in sustaining the personnel training and is stimulating the personnel in terms of: assuring the technical and financial support for preparation of PhD and MSc thesis, supporting the patents, publishing, participation to conferences expenses, offering a 15% pay rise for PhD;
- The institute is also sustaining the training through stages and specialization courses outside its boundaries; participation to project brokerage events; participation to project management meetings for ongoing projects; support for researchers contact with other researchers from Romania or abroad.

Technological transfer & dissemination activities

- The applied character of institute's research works and the economic-financial crisis conditions from the last years determined an orientation to technological research and services with direct applicability in the economic environment.
  - Constantly, in the last 3 years, the institute's support from private financial sources is ≥50%;
    Within the institute's portfolio there are more than 300 national or international clients, from which some traditional and many new clients, big industrial units or SMEs.
    Among traditional representative clients must be mentioned: Petrom, Lukoil, Rompetrol, Terapia Cluj, Oltchim Rm. Valcea, Mittal Galati, Chimcomplex Borzesti, Conversmin, RMGC, etc.
  - The project financed from national public funds are developing in partnerships with potential users, hat are participating to projects completion and are using its results.
- Dissemination of the results is performed through specific methods: patents, publications, communication of the results to scientific events
  For a large part of the projects financed from national and international funds, brochures and workshops dedicated to the results are developed / organized, with participation of economic units representatives, local environmental authorities, water – sewerage operators, in order to assure an adequate dissemination of the result and to find out new opportunities for diversification, adaptation, development, of technological transfer, products and methods
- In the aim to disseminate the results to economic units and partners from national and international scientific community, the institute is organizing the International Symposium "The Environment and Industry" an useful tool for new collaboration opportunities.

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The newly created modern infrastructure, modernized and new laboratories, endowed with state of art apparatus, equipments and installations, the continuous attention to personnel training and stimulation of personnel for research and partnerships with scientific community and economic environment is creating optimum conditions for an excellence environmental research.

3. Activity report by team

3.1. Activity report of team E1 - Pollution Control of Water, Soil and Wastes

The team **Pollution Control of Water, Soil and Wastes –E1,** is part of the Pollution Control Department (DCP) from INCD-ECOIND and has, as main profile of activity, research and services in the field of environmental pollution control of water, soil and wastes.

3.1.1. Research directions

Starting from 1978, the research activity was focused on development of analytical methods for the control of the pollution level of waste waters evacuated from industrial activities. In time, according to the requirements of the environmental legislation and also of the development of new analytical techniques other scientific areas/domains were approached, namely:

- *development of analytical methods for the control of soil pollution level* (methods for organic and inorganic pollutants);
- *evaluation of the quality of surface water and sediments from aquatic ecosystems* (metallic species bioavailability, migration potential of mobile ionic species of toxic metals from soil and sediments to water bodies);
- *development of accurate and sensitive methods of analysis for a complete investigation of drinking water quality*.

At present, the team diversified the research activities by developing other subjects of interest in the field of environmental research:

0. ***Development of new analytical methods for the control of priority substances in water, soil and wastes:***
   - studies for the elaboration of qualitative and quantitative methods of analysis for organic pollutants included in the list of priority substances;
   - "in-house" validation of the new methods developed in the laboratory by estimation of performance parameters and/or by organization of collaborative inter-laboratory studies;
   - development of analytical methods for determination of trace pharmaceutical compounds from residual effluents;
   - the spatial-temporal evolution of the pollution level with priority substances in different aquatic ecosystems
1. ***Researches concerning drinking water quality from catchment to consumer:***
   - complex physical-chemical studies of drinking water quality from raw water (surface water or ground water), to treatment plant processes, distribution system and consumers;
   - study of the influence of materials used in drinking water distribution system on the migration of toxic metals to drinking water at the consumer's tap.
2. ***Methods for the characterization and evaluation of solid and liquid wastes:***
   - studies related to the physical-chemical characterization of different types of wastes (e.g. sludge from waste water treatment plants, petroleum wastes);
   - estimation of the characteristic properties of wastes, using leaching tests (e.g. for petroleum wastes, demolished construction materials, polluted soils);
   - evaluation of the composition and characteristics of the sludge from waste water treatment plants for elaboration of solutions for their reuse or removal.
3. ***Environmental statistic indicators and judicial analysis:***
   - elaboration of statistic indicators for chemical substances in accordance with EUROSTAT requirements (e.g. production, consumption per capita, transportation, risk of chemical substances);
   - identification of sources of pollution with persistent organic substances based on benches of data previously developed (e.g. for PAHs, for organic compounds with sulph, for volatile organic substances).

3.1.2. Projects / contracts

The research activity was realized in different types of projects financed from national or international, public or private sources (productivity of 2.375 projects&contracts/member team and 3.166 projects&contracts/researcher). Most of the research activity was performed in cooperation with other teams from ECOIND but also with other Research Institutes (e.g National Research Institute in Informatics, Institute of Micro Technologies, National Institute of Statistics) and Universities (e.g. University of Bucharest, University of Agronomy from Bucharest, Technical University of Civil Engineering Bucharest). The main results are presented below:

Directions	Projects/contracts	Project/contract results
Development of new analytical methods for the control of priority substances in water, soil and wastes	•5 public international projects (financed by Balkan Environmental Association, TACIS, COST, Research innovation Norway, Romania-Bulgaria cross border cooperation); • 2 public national projects (financed by CEEX[3];PNCDI II [4]) • 15 private national projects/ contracts (financed by companies from private sector)	• 22 new methods of analysis for different classes of priority substances present in water, soil and wastes; • 14 studies regarding the evaluation of the level of pollution of water, soil, sediments inclusive for priority substances; • 8 in-house[5] projects; • 12 scientific papers published in journals with relative AIS[6]; • 7 scientific papers published in ISI journals; • 1 scientific paper published in non ISI journals; • 8 communications published in extenso; • 6 communications published in abstract; • 5 training courses about QA/QC measures in environmental labs • 1 inter-laboratory scheme for wastewater.
Researches concerning drinking water quality from catchment to consumer	• 2 public international project (financed by EEA Grants, COST); • 1 public national project; • 4 private national projects/ contracts (financed by companies from private sector)	• 4 studies regarding drinking water quality; • 2 in-house projects; • 1 scientific paper published in ISI journals; • 2 scientific paper published in non ISI journals; • 2 chapters of books. • 2 communications published in extenso; • 2 communications published in abstract; • 2 training courses; • 1 inter-laboratory scheme for drinking water.
Methods for the characterization and evaluation of solid and liquid wastes	• 2 private international projects (financed by Envisan, Halcrow) •1 private international project (financed by Mott MacDonald); • 3 private national projects/ contracts (financed by companies from private sector)	• 6 studies regarding characterization of petroleum wastes; • 2 in-house projects; • 3 scientific papers published in ISI journals; • 2 scientific paper published in non ISI journals; • 1 communication published in abstract.
Environmental statistic indicators and judicial analysis	• 2 public international projects (financed by Phare, EU –JRC); • 1 public national project (financed by PNCDI II)	• 5 statistical indicators for dangerous substances; • 2 methods for identification of sources of pollution with organic pollutants; • 1 book (publication of the National Institute of Statistic for EUROSTAT) • 1 communication published in extenso; • 1 communication published in abstract. • 1 trainings for statistic indicators and 3 trainings concerning REACH Regulation

The results of the research activity were put in practice by technological transfer and by transfer of knowledge to central and local administration or to public and private companies based on different types of studies/contracts related to: contamination of industrial effluents with priority substances; evaluation of sludge characteristics; professional formation in the field of analytical control of environmental pollution and of chemicals by organization of training courses, organization of inter-laboratory comparisons for indicators

[3] Research of Excellence Programme 2005-2005
[4] National RDI Plan 2007-2013
[5] These are projects supported by the institute own financial sources elaborated in order to search for new research directions / domains
[6] Article Influence Score

from waste water and drinking water, design and documentation of the quality management system ISO17025 to testing environmental laboratories.

3.1.3. Human resources evolution

For achieving the research activities, during the mentioned period, the research team was composed of **16 persons** of which **7 were senior researchers** (6 chemists and 1 chemical engineer) with high level of expertise (*2 CSII, 5 CSIII*) and **5 young researchers** (4 chemist, 1 economist) which started the research activity immediately after finishing their university studies (*1 CS, 4 AS*[i]). For technical operation the team includes technicians (*1 T I, 3 TIII*). The number of personnel was constant in the last 5 years but it was observed the tendency of young scientists to leave the research activity / team after a period of 1-2 years. The average age of the team is **44.5 years**.

At the moment, from the total number of personnel (16), 12 are female staff (75%), 2 are doctors (PhD), 4 have master degree, 2 are doctoral (PhD) students and 2 are master students. In the last 4 years were finalized 2 doctoral studies and 2 master studies in the field of chemistry and management. All categories of personnel participated to programs of professional in-house trainings or to trainings, conferences, workshops organized by different Universities or Research Institutes. One young researcher participated to a scholarship of 6 months, in Spain.

3.1.4. Infrastructure

The research activity is performed with new, modern and equipment which allow experiments and analytical investigations with high level of accuracy and precision: 4 *Gas chromatographs with MS, FID, ECD, NPD, FPD detection and 1 High resolution GC-MS;2 Liquid chromatographs with MS, UV and FLD detectors and 1Ion chromatograph; 2 Atomic absorption spectrometer with flame and cold vapours and 1 ICP-EOS; 1 Spectrometers UV-VIS and 1FTIR; 2 TOC analyzers for solid and liquid samples and 1AOX analyzer; Portable equipment for field analysis and sampling devices for water, soil and waste samples; different equipment for the pre-treatment of water, soil and waste samples.*

For having a complete endowment we intend to purchase in 2012 modern auxiliary equipment used for the pretreatment of the samples: one automatic extractor for accelerated extraction with solvents, one automatic system of concentration in nitrogen atmosphere, one installation for total nitrogen and Kjeldhal nitrogen digestion, one microwave furnace for pretreatment of sludge, one nitrogen generator.

Quality management systems

For assuring research results with high level of quality, the activities of our team are performed in accordance with the requirements of the quality systems ISO 9001, ISO 14001 and most part of the analytical methods are accredited ISO 17025 and are authorized by the Ministry of Health (for drinking water physical-chemical methods).

3.1.5. Objectives for future development of the team

Taking into account the experience accumulated and also the modern infrastructure, the team intends to develop new research activities in the next 4 years (2012 – 2015), such as: analytical research for development of sensitive methods for dioxins and furan, pharmaceutical residues, steroid estrogens from water and soil; specific methods for testing the effect of different types of materials used for drinking water distribution on water quality; screening methods for different types of wastes. For this, we intend to participate in minimum 7 national and international projects and in 30 projects /contracts financed by companies from private sector. The results will be published in minimum 5 ISI articles each year and in 2-3 book chapters. For achieving the proposed targets it will be necessary to extend the research team with 2 young researchers specialized in organic and analytical chemistry and to maintain and extend the continuous training activity for all categories of personnel.

3.2. Activity report of team E2 - Bioassays and Biological Analysis Laboratory

Before 1990, there was in INCD-ECOIND, a complex biology department that responds and covers all fundamental and applied biological research needs of the other laboratories / departments of the institute (technological laboratories and analytical control department). The main activities of that department were: specific analysis to characterize the organic loading of water samples and the active sludge; experimental researches on biological treatment of waste waters; applied researches on sludge recovery and the biogas production; environmental assessment studies; acute and chronic toxicity bioassays with aquatic organisms (freshwater fish); hydro-chemical and hydro-biological characterization studies of river basins in Romania.

Personnel specialized in biochemistry and ecology (from the biology department of the institute) formed after 1992, the research team E2 (Bioassays and Biological Analysis Laboratory), to diversify **the research directions in environment protection and extend research services** that can be directly applied in economy, to stimulate innovation demand from the business environment, in particular, for the following specific areas:

- biological and bacteriological monitoring of environment, according to national/European legislative norms;
- improving and optimizing of national standard methods applied for biological/microbiological environment quality control and eco-toxicological studies, in accordance to EN/ISO standards /EPA /OECD methods;
- development and use of biosensors for rapid control of specific pollutants in the surface water and / or effluent discharged into natural emissaries;
- screening and simulation tests developed to identify metabolic pathways and breakdown of different organic compounds – aromatic amines, nitro-derivates, pesticides, organic-chlorinated substances, anionic and nonionic surfactants – and to establish their maximum level of biodegradation and the admissibility limits in biological waste water treatment plants;
- development of biochemical studies to assess the toxic effects caused by hazardous chemicals on aquatic organisms and to determine enzymatic activity of intoxicated fish organs (liver, kidneys, gills, intestine, muscle) and also, to evaluate the physiological state of biological sludge or soil microbial activity;
- toxicity bioassays development to evaluate the toxic effect of water pollution upon aquatic organisms and to estimate the inhibitory effect on the energetically metabolism of sludge microorganisms – establishment of the lethal toxicity concentration – LC_{50}, the maximum allowable toxicity concentration – MATC and the concentration which inhibits the oxygen up-take by 50% - CE_{50};
- implementation of new eco-toxicological methods – *microbiotests* (based on microalgae, bacteria and species of crustaceans - *Daphnia*), as alternative to classical animal testing methods, for assessment of the ecological risk generate by chemical hazardous, giving due consideration to the European Regulation REACH restrictions, asking for no more animal experiments;
- assessment of the ecological status of water bodies in Romania and the impact of industrial pollution on aquatic ecosystems.

Improvement of the quality and scope of the research activities and environmental services with direct application in the economic sector, imposed:

- development of the existing research infrastructure and setting-up adequate working space, depending on specificity and traceability of research works carried out;
- laboratory endowment improvement - procurement of new R&D equipments /apparatus, that supported the expansion and diversification of the specific research topics;
- diversification of the personnel's qualifications and attracting of young graduates, master's and doctoral students from the faculties of biology, who wish to become researchers in a recognized institute on Romania environmental market.

Research team E2 is part of the Pollution Control Department and operates in Integrated Quality – Environment Management System, according to SR EN ISO 9001:2008 and SR EN ISO 14001:2005 and is accredited by RENAR, in accordance with EN ISO/IEC 17025:2005. Acute lethal toxicity study with fish has been certified in accordance with OECD principles of Good Laboratory Practice.

3.2.1. Research directions

Most important research directions developed in the last 4 years:

D1) Biological/eco-toxicological methods to assess the integrated ecological risk of hazardous chemicals and to evaluate the aquatic ecosystem quality;

D2) Researches for implementation of new methods used in bacterial pollution control of water, soil/sediments/sludge and atmospheric air;

D3) Enzymatic techniques to establish toxic effects of chemicals upon aquatic organisms and to value the physiological state of sludge microorganisms;

D4) Hydro-biological and microbiological studies for aquatic ecosystem control and biodiversity monitoring; Identification and monitoring of ecological status of water bodies in accordance with WFD.

3.2.2. Projects / contracts

Research projects financed from public funds in national and international R&D programs and national / local budget of authorities and also, from private funds held by various economic companies, are developed to meet the specific objectives of European Programs and Romanian RDI 2007-2013 strategy, in terms of environmental protection researches.

During 2007-2011, **team E2 were submitted 15 project proposals** (11 national and 4 international proposals) of which, **four national and one international projects have been accepted for funding**.

The research team participated to the implementation of: **9 national projects** in different Romanian programs (**CEEX; PNCDI II** / Partnerships) and **8 international projects** (**EEA Grants; COST; PHARE; FP7; Structural Funds**/SOP-IEC and SOP-HRD; Romania-Bulgaria Cross border Cooperation). Also, researchers of team E2 were involved in carrying out activities within **2 international projects and 20 national projects financed from private sources**. Annually, each young researcher of E2 team, develop one project (in-house project), supported by the institute own financial sources. Results of in-house projects underlying fundament of new proposals in national and / or international calls or are materialized in new methods implemented in the laboratory current practice as respond to the demands of business entities. **The main research results** are summarized in the table below:

Directions	Projects /contracts	Reaseach activity results
D1) Development of biological/ecotoxicological methods to assess the integrated ecological risk of hazardous chemicals and to evaluate the aquatic ecosystem quality	4 projects from international public sources 2 projects from national public sources 5 projects from national private sources	- *7 experimental models* for ultimate biodegradability and aquatic toxicity assessment of commercial detergents and ecological products - *10 products* (methods and methodologies for assessing the acute and chronic aquatic toxicity and environmental risk) - *6 studies* (ecotoxicological and environmental risk assessment) - *4 scientific papers* published in ISI journals - *10 communications* published in extenso - *100 research services* (biological analysis, biodegradability and aquatic toxicity studies)
D2) Researches for implementation of new methods used in bacterial pollution control of water, soil/sediments/sludge and atmospheric air	3 projects from international public sources 7 projects from national public sources 1 project from international private sources 7 projects from national private sources	- *7 products* (3 microbiological methods for water control and 4 methodologies of atmospheric air pollution control) - *2 studies* (microbiological monitoring of drinking water and surface water quality) - 3 *scientific papers* published in non ISI journals - 4 *communications* published in extenso - *2 training courses* - *200 research services* (microbiological analysis for monitoring the environment quality)
D3) Enzymatic techniques to establish toxic effects of chemicals upon aquatic organisms and to value the physiological state of sludge microorganisms	1 project from international public sources 3 projects from national public sources 1 project from national private sources	- *6 products* (2 enzymatic methods for sludge control and 4 biochemical methods for assessing the toxic effects on aquatic organisms – fish); - *2 biochemical research studies* for assess the fish organs intoxication degree; - *1 scientific paper* published in ISI journal - *3 communications* published in extenso
D4) Hydro-biological and microbiological studies for aquatic ecosystem control and biodiversity monitoring; Identification and monitoring of ecological status of water bodies in accordance with Water Framework Directive	1 project from international public sources 3 projects from national public sources 1 project from international private sources 7 projects from national private sources	- *5 products* (2 methods for determining phytobenthos and chlorophyll„a"; 3 methodologies to analyze the aquatic ecosystems) - *5 hydrobiological research studies* to assess the water body quality and biodiversity monitoring - 2 *scientific papers* published in ISI journals, - *1 chapter in book* - 5 *communications* published in extenso - *50 research services* (monitoring and evaluation of surface water quality – rivers, lakes from Romania)

The research results obtained during and after, the projects implementation, were also, and disseminated within round tables / workshops and by distribution of informative publicity materials (flyers / brochures / posters) within national/international exhibitions / scientific research fairs. In order to achieve high quality results on scientific research projects, the team constantly

collaborated with other experts/specialists from research institute and also with scientific and academic research teams from universities.

3.2.3. Human resources

The research team (**average age 40 years**) consist of competent staff (**9 women and 1 man**) in accordance with the specific activity fields – 5 senior researchers (3 CSIII[1] and 2 CS[1]), 2 ACS[2] and 3 technicians.

In team are specialists with high expertise in the field of: biochemistry (enzymology and ecotoxicology), hydrobiology / aquatic ecology, microbiology, and also young researchers (2 PhD Students, 2 MSc and 1 Ms Student) with real skills for research activity and dedicated to the institute. The team is always concerned about the newest and innovative researches in its field, so, is attending regular to training courses, professional exchanges, organized in Romania or abroad. In the past 4 years, and now (2011), the research team initiated (as a coordinator) and participated (as partner) in scientists consortia with different specialties, on significant number of national and international projects development. Qualification and competence of the team, facilitates direct contracts with private companies, which regular monitoring environmental factors or manufacturer / importer / trader substances / products whose environmental compatibility must be tested, prior to be placed on market.

3.2.4. Infrastructure

Research infrastructure has been continuously improved and developed – funding of various research projects implemented by research team, made possible to equip laboratories, as well as ensuring the conditions and facilities necessary for performing specific types of activities.

Thus, the microbiology laboratory has three separate rooms, built and equipped in order to ensure personnel safety and also, sterility working conditions to minimize the risk of samples contamination; the ecotoxicology laboratory has an adequate aquatic infrastructure for performing the acute and chronic toxicity experiments on fish and specific equipments for microbiotests (algae, *Daphnia sp*., bacteria tests); the hydrobiological laboratory are equipped to allow both biological analyzes of water and sediment samples, as well as biodegradability and environmental risk assessment studies. The necessary facilities for related activities (receiving/ storage / preparation samples, weighing/reagent solution preparation) are also, provided.

3.2.5. Objectives for future development

Constantly preoccupied with the expansion and diversification of research activities, the team initiated this year, a project proposal in PNCDI II[3] and also, participated as partner at two international project proposals. In the near future, there will be paid a special attention to calls launched in the national and international research plans – in the next four years, we intend to participate with at least **5 new project proposals** and to improve the dissemination activity of research results by **publishing 8 scientific papers in ISI journals with relative influence score**, and also, to participate in **drafting of a book**. The team aims to **deepening ecotoxicology research and expanding the range of enzymatic analysis and microbiotests applied on soil microorganisms toxicity assessment**. In addition, to the studies conducted to assess the ecological status of water bodies and biodiversity, ecologist researchers intends to **develop new studies** based on composition and structure of food chains, in order to protect and restore them, when they reach the limits of natural functions and productive capacity, conceptual and mathematical modeling of socio-ecological systems.

Also, in order to respond at the business environment requirements and needs, the team will **extend the researches** regarding: the biodegradability assessment by implementing new methods to evaluate chemicals biodegradability under anaerobic conditions and also, plastics materials biodegradability, microbiological analysis of the parasites in surface water and microbiological air pollution monitoring. The development/ expansion of research studies in specific areas, will require the **extend team number by attracting 1-2 higher training young researcher, and improving the endowment of ecotoxicology laboratory, aquatic ecology and microbiology** (the purchase of **4 new equipments** an **ecological software application and improvement of toxicity laboratory facilities**).

3.3. Activity report of team E3 – Air Pollution Control

Air Pollution Control Laboratory (E3) was founded in 1995 from the necessity to complete the institute field of research with environment component air: ambient air quality correlated with quantitative and qualitative emission levels as well as the industrial noise.

3.3.1. Research directions

The first research directions in '90s were based on:

- Development of new analytic methods to determine the pollutants from stationary sources emissions, due to lack of standard methods, both national and international
- Research studies concerning the pollution level for industrial areas and ambient air.

The previous mentioned research directions are still of interest (1 and 4 from below); they are conducted with high performance equipments and qualified personnel able to assure the performance level required by national and international in force standards. In the present, the research directions of team "Air Pollution Control" – E3 were diversified with new approaches in the air pollution domain:

1. ***Development and validation of new methods for the determination of air pollutants from emissions and ambient air***
   - Development of new methods for determination of hazardous/ priority hazardous substances from stationary sources emissions (heavy metals, volatile organic compounds, PAH, phenols);
   - Validation of the developed methods trough "in-house" validation or international interlaboratory comparisons schemes, including determination of the performance parameters for the applied analytical techniques;
2. ***Assessment of chemical and phonic air pollution using mathematical models***
   - Studies concerning the ambient air quality based on dispersion modeling of pollutants released by stationary emissions sources;
   - Estimation of phonic pollution generated by industrial activities using noise maps;
3. ***Research concerning assessment of greenhouse gases emissions (fuels characterization, emission and oxidation factors, emission level, methods validation)***
   - Methodologies to estimate the level of greenhouse gases emissions generated by energetic systems or industrial activities based on determination of oxidation and emission specific factors;
   - Studies concerning solid/liquid, classic/alternative fuels characterization in order to estimate the level of greenhouse gases emissions;
   - Validation/comparison of the methods used for fuels characterization trough comparison of the results obtained by the laboratories without SR EN/CEI 17025:2005 accreditation;
4. ***Studies concerning air pollution from industrial areas with dangerous substances***
   - Studies to estimate de level of ambient air pollution with hazardous/priority hazardous substances;
   - Assessment of air pollution level in industrial areas due to emissions generated by the stationary sources;
   - Research for industrial noise pollution and measures to reduce these levels using phono-absorbent panels;

All the above mentioned direction were developed in research projects/contracts financed from private or public funds; some of the obtained results were applied in contracts with third parties in order to solve their environment duties imposed by the environment legislation.

3.3.2. Projects

The projects developed by the team approached actual national and international thematic concerning emission assessment and forecast as well as control of air quality in correlation with population's health:

- Research concerning ambient air pollution from urban areas with intense traffic with breathable dust PM 2.5, including heavy metals and PAH's adsorbed on particles in correlation with population health status; this project was developed in a PNCDI II program, having as partners The Public Health Institute from Bucharest and Polytechnic University from Bucharest;

- Development/validation and accreditation according with SR EN ISO/CEI 17025:2005 of new methods for determination of volatile organic compounds and heavy metals from stationary sources emissions; these activities were conducted in two CEEX projects; during the project were acquisitioned all the necessary specific equipments for sampling and analysis;
- Elaboration of air pollutants emission mean and long term forecast (NH_3, SO_2, NO_2, COV) generated by the industrial activities – sectoral project;
- Research concerning chemical air pollution from industrial areas;
- Estimation of chemical and noise level pollution using mathematical models;
- Organizing inter-laboratory comparison schemes for determination of inorganic pollutants in air and for solid and liquid fuels characterization;

The productivity of the team was of 0.92 project & contracts/member team and 1.2 project & contracts / researcher)

The results of the research projects/contracts, grouped on main research direction, are presented below:

Research direction	Projects	Results
1 - Development and validation of new methods for the determination of air pollutants from emissions and ambient air	- 4 projects financed from national public funds	-18 new methods for determination of air pollutant from ambient air and emissions: HAPs, heavy metals and volatile metals, phenols, chlorinated organic compounds) - 3 „In-house" projects - 3 publication in non ISI publications - communications: 6 full papers, 6 summaries - 2 interlaboratory comparison schemes - 4 booklets, 5 workshops
2 - Assessment of chemical and phonic air pollution using mathematical models	-4 projects financed from private funds	- 4 studies for mathematical modeling of pollutants dispersion into air - 3 publication in non ISI publications - 3 „In-house" projects - communications: 6 full papers, 4 summaries
3 - Research concerning assessment of greenhouse gases emissions (fuels characterization, emission and oxidation factors, emission level, methods validation)	-3 research contracts financed from private funds	- 3 validation studies - 2 „In-house" projects - communications: 1 full paper, 1 summary
4- Studies concerning air pollution from industrial areas with dangerous substances	-1 project financed from private/public funds	- 21 studies concerning the assessment of air pollution level in industrial areas - communications: 3 summaries

Each year there are financed from own funds "in-house" projects which approach new thematic for national and international actuality; many of these projects represent the base for future new research projects or domains. An good example is the "in-house" project „Breathable PM 2,5 particulate maters - risks and dynamic" which lead to the project „Impact assessment of pollution with PM 2.5 breathable dusts from urban areas with intense road traffic on the inhabitants' health status – PMAER" financed from public funds trough PNCDI II financing program.

Important information for development of research domain 2 and 3 were obtained from more "in-house" projects with thematic mathematical modeling of pollutants dispersion into air or statistical treatment of data and validation/comparison of the analytical methods.

3.3.3. Human resources

The team (13 - 7 women and 6 men) is formed by **10 researchers** (8 CS III, 1CS and 1AS), chemist engineer (7), chemists (2), ecologist (1) and 3 technicians (2 Th I and Th III) with an **average age of 45 years**. Two of the team members have master degrees; tree of the team members are PhD students having thematic with potential for continuous development of the research activities in the present domains but also in the new one:

- Indoor air quality;
- Reducing the noise pollution level using phonoabsorbent panels made from composite materials;
- Techniques using membranes to reduce the air pollution with heavy metals.

The team members are continuous participating at different national and European scientific events as well as at training/information courses; the professional training level improves constantly as shown by the results of the evaluations in the last years.

3.3.4. Infrastructure

The last four years were very favorable for the team from the equipment acquisition point of view. In 2 CEEX projects, 1 PNCDI II project and POSCCE project there were acquisitioned equipments for research with a total value of 547500 euro (with a mean equipment value of 15000 euro):

- Atomic absorption Spectrometer – AAS Spectra AA 280 FS
- Paul Ghote isokinetic dust sampler and Sampling pumps
- Automatic analyzers MMS for CO and NO_x; AF22M for SO_2
- Automatic analyzers for total organic carbon ThermoFID and Sick Maihak
- Gas chromatograph CP-3800
- Elemental analyzer FLASH EA 1112 CHNS-O and Calorimeter Parr 6200
- Portable gas chromatograph CP 4900
- Auto laboratory
- Software for mathematical modeling and for data statistical treatment.

The research activity is carried on very good environment conditions, in a new building, according with the quality requirements, new laboratory furniture, new laboratory niche and all necessary utilities.

3.3.5. Perspective/ objective for future development

Taking into consideration all before presented and knowing the development tendencies of the domain at international level we propose for the future:

- Further development of the actual research domains and approach of at least one new research domain – indoor air quality;
- Participation as partners in European and national research programs, at least 5 projects in the next 4 years;
- Articles published in ISI publications, at least 3/year;
- Increase the number of researches with doctoral studies, at least 3;
- Professional training courses, scientific events in the domain, at least 10/year;
- Increase the team with young researchers, at least 1;
- Completing the existing infrastructure with new equipments:
  - Spectrometer UV-VIS (34);
  - Portable analyzer for CO, CO2, NOx, SO2 with IR and chemiluminescence (35);
  - Automatic titration equipment (36);
  - pH / conduct meter for ultrapure water (37);
  - Samplers for high air volumes PM 10, PM 2.5, TSP (38).

3.4. Activity Report of the team E4 - Environmental Pollution Assessment & Monitoring

The E4 Team of the Departament to Environmental Pollution Assessment & Monitoring (DEMPM), has carried out, from the date when INCD-ECOIND was founded (1978), many applied research activities having as objectives, among others: studies in the characterization and treatment of effluent wastewater from units in the chemical industry as well as the ellaboration of wastewater purification technologies. Starting from the 1990s, in parallel with transformations of the Romanian economy, the E4 Team has developed new activities including preliminary impact assessment studies.

3.4.1. Research Directions

Approaching a modern and efficient management, the management of the E4 team has ensured the continued development of research directions. Thus, in the period 2007-2011, were considered fundamental and applied research activities focused in the following directions:

1) Assessment of industrial pollution and environmental risk in accordance with the current Romanian methodologies and legislation;
2) Development of industrial waste management studies.
3) Studies in the mobility of hazardous substances in aqueous environments (e.g., existing metals in surface waters and transformations suffered by their ionic species);
4) Studies in the use of advanced materials in technological processes specific to environmental protection and in the recovery of useful substances.

During the reporting period, team members started also some other topics of research; significant examples are:

a) the development of modern methodologies of hazard assessment of various wastes and the evaluation of risk induced by waste disposal on the environment (landfill gas emissions, pollutant migration in soil / underground and groundwater);
b) development of solutions to reduce soil pollution with heavy metals by phyto-remediation

Research directions have been addressed progressively during the reference period, aiming to diversify the environmental issues they must respond, in accordance with the Environmental Protection approach and policies at national and European level. One permanent concern is the development of these research directions and the identification of new ones, such as that relating to industrial risk. In this way the research team E4 responds to the INCD ECOIND vision of becoming a recognized national leader, having a good international visibility, in the field of environmental research and environmental services.

3.4.2. Projects and results

Research carried out by the E4 team members have been and are currently connected to the national and sectoral issues of environmental research and related areas, and the specific requirements of the environmental market. They respond to the following three categories of objectives:

- **Specific objectives of the priority areas** of national research programs (CEEX, National Plan for R & D and innovation);
- **Specific objectives of environmental sectoral policies**;
- **Specific objectives of the activities of the undertakings of compliance** of companies to the environmental legislation.

During the 2007 – 2011 period, in order to fulfill specific targets in the priority areas of the national research programs, the E4 team **coordinated** 3 research projects PNCDI II and participated as a project partner CEEX in 3 research projects PNCDI II. The 3 projects were coordinated by E4 responded to specific objectives in the D3-Environment.Research mainframe. The projects in which E4 team participated as a partner focused on problems both in the D3-Environment Research and in related fields to it (D7-Advanced Materials, D2-Energy and IT). During its participation to R&D projects of national plans, the E4 team has worked together with **prestigious universities**, national research and development institutes internationally recognized and with

companies having research departments. Partnerships with research entities in the universities were formed in order to establish bi-univocal relations that would contribute to the development of specific areas of environmental science (directly by addressing topics of fundamental and applied projects and indirectly through training / advanced training of specialists / researchers in the environment science- by organizing project's thematic courses, master degrees, doctorate degrees).

Collaboration of E4 members with universities in projects carried out during 2007-2011 led to the creation of **new research opportunities**, evidenced by applying, during 2011 of five joint projects in the Partnership Program. The structure of the consortiums formed to carry out the proposed Projects includes at least one partner-university. The results contribute to improve the quality of the environment and create opportunities for recovery (in favorable economic conditions) of renewable energy resources. Some results were transferred directly to beneficiaries (e.g., databases / metadata and a computer-software product specialized to track the dynamics of the ecological status of the emissary river **were transferred** to the Suceava branch of the National Company "Romanian Waters"); some others will be used in the mainframe of the INNOVATION Programme, in order to transfer them to the business environment.

In order to fulfill objectives specific to sectoral policies, the E4 team participated in the **2 sectoral projects** (in one of them as a coordinator). Both projects were carried out by strategic consortia composed of nationally and internationally recognized R&D entities. The projects were carried out in the mainframe of the Romanian Sectoral Plan dedicated to industry research and development activities and aimed at the harmonization of the business agents with environmental regulations. The results of the two projects were **transferred** to the Contracting Authority (METBE) and were used by it to improve the economic environment in Romania, by developing action plans, strategies and forecasts in the areas addressed.

The productivity of the team was of 0.6 projects/member team.

Regarding the third category of objectives, the research work performed materialized in the development of **over 40 studies** and specific environmental documentation. The results were fully transferred to business companies, donors, financial supporters and beneficiaries of research.

Results achieved

The results of the E4 team during the 2007-2011 are reflected in:

years		**2007**	**2008**	**2009**	**2010**	**2011**	**Total**
Project results		**50**	**65**	**61**	**67**	**82**	**325**
Technologies		-	5	-	2	-	7
Models		-	3	2	2	1	8
Services		35	36	42	43	48	204
Products		-	-	-	2	-	2
Patents		-	-	-	-	3	3
Articles		1	7	-	3	7	18
Studies		6	8	8	10	10	42
Others		8	6	9	3	13	41
	communications	6	6	7	5	10	34
	workshops	1	-	1	-	-	2
	brochures	1	-	1	-	1	3
	books	-	-	-	-	2	2

3.4.3. Human Resources

The E4 team included in its structure in 2007-2011 qualified / certified personnel, covering a wide range of professions: chemists, chemical engineers, geographers, ecologists. In the 2007-2011 period, the E4 team had little staff fluctuations (departures / advent). In 2007, research staff consisted of two 1st degree, one 2nd degree, two 3rd degree Researchers, 4 Researchers and 3 graduated employees (non-attested); currently the E4 team consists of two 1st degree, two 2nd degree, four 3rd degree Researchers, and 2 Researchers. As shown by this statistics, in order to achieve a professional standard comparable to scientific research entities

recognized nationally and internationally, the E4 team members were concerned, during the reference period, by the development of their knowledge, skills and competences in the areas addressed. Thus, from the professional point of view, four of the team members participated in two training courses dedicated to “Professional skills Evaluator" and "Environmental Auditor". in the same time, three of the team members were part of the team to carry out the three projects under the Sectoral Operational Programme Human Resources Development (HRD). One of these projects will be completed with the establishment of a "Professional Skills Assessment Centre" which will be led by one of the E4 team members. In terms of their scientific preparation, in 2007-2011, two masters and three doctoral internships were completed (two completed by the graduating university doctoral program in HRD). Currently, the team includes 5 PhD members and a doctoral student. The increase of the scientific level of its members was achieved also by the participation of the members to a great number of national and international scientific events.

3.4.4. Infrastructure

Approaching the subjects mentioned above was made possible by the continuous development of the material base available for the team. Equipment that meets the requirements for the mentioned research directions were purchased during the reporting period. High performance hardware is currently under use, more significant being the following: TOC analyzer with IR detector for liquid samples, plasma spectrometer ICP MS for the multi-element analysis of wastewater, groundwater and solid samples; Permeability meter, GIS platform, soil gas analyzer; a mobile van with testing capabilities having specific equipment for sampling and field sample characterization.

3.4.5. Objectives for further development of the team

E4 team's most relevant **weakness** was, during the period 2007 to 2010, its involvement in European & international research projects. Starting from 2011, the E4 team is a project partner to a research program involving Romania and Bulgaria, program funded from European sources. A permanent concern of the E4 team is the identification of potential European projects having similar research themes / connections to those of the E4 team, in order to join those Projects and take part in their development and implementation.

Threats of further development of research directions followed by the E4 team are derived from the current economic crisis and are materialized in drastic reduction of budgetary funding allocated for research activities. In this direction the E4 team members strive to mitigate these threats, by addressing those research directions that involve increased participation of private funds (from economic agents, private companies direct beneficiaries of our research activities) as well as EU R&D funding sources.

For the next 5 year horizon, it is expected that the E4 team **upturn in activity be maintained / developed** by achieving the following objectives:

- Coordination of at least three research projects in the mainframe of the future competition in the Partnership Program;
- Participation in 2 international projects;
- Publication of at least 6 papers in ISI journals with SRI greater than 0.5;
- Completion of a doctorate degree by 2014.

3.5. Activity report of team E5 - Environmental Technologies and Technological Transfer

The research activity of E5 team focused, before 2000, on the physical-chemical and biological wastewater treatment of industrial and municipal effluents. After that period, the research activity gradually diversified, correlated with the national strategies, mainly that for RDI and sustainable development, the demands of the Romanian environmental market, and the European research directions, promoted by both EU programs - FP6/7, COST and European technological platforms (Water Supply and Sanitation Technology Platform, Sustainable Chemistry Technology Platform).

3.5.1. Research directions

The general research directions of E5 team are the followings:

- E5.1: Development of ***innovative and sustainable technologies/biotechnologies*** for advanced removal of nutrients, priority substances from water/wastewater, with the *sub-directions:*
    - identification/diminishing/removal of xenobiotics from water intended for human consumption destination
    - solar treatment technologies
    - new developments of environmental biotechnologies.
- E5.2: Promotion of ***alternative technologies for revamping the wastewater treatment*** plants
- E5.3: Eco-technologies based on ***physical-chemical and biological processes for contaminated soils remediation***
- E5.4: Technologies for ***organic waste processing with their recovery***
- E5.5: Principles of ***eco-efficiency and industrial symbiosis*** applied in corporative development approach of industrial operators.

3.5.2. Projects

Most of the present research directions (E5.1 ÷ E5.4) were initiated between 2000-2006 as Nucleus projects, CERES project, Sectoral projects, direct contracts (industrial units) and further developed (E.5.5) within the national and European projects framework.

During 2007 – 2011 the E5 research team was involved, as coordinators and partners, in ***carrying out 36 projects*** (representing about 29% of the ECOIND total number of projects and having a productivity of 1.64 projects/member team and 2.25 projects/researcher)). These have been financed from external or internal, public or private funds, and six are still ongoing projects.

The projects supported from public and European funds were developed in association with national and international universities, research institutes and industries.

More projects were carried for each research direction:

- Direction E5.1 – projects from private national funds, Eureka Programme, external funds, such as: EEA Grant, CEEX and PNCDI II projects
- Direction E5.2 – projects from Sectoral Programme, external private funds (industries)
- Direction E5.3 - FP7 project (Theme 6 "Environment including climate change"), Eureka - Eurostars project
- Direction E5.4 - CEEX and PNCDI II[ii] projects
- Direction E5.5 - external project (Cooperation Programme of Norway with Romania and Bulgaria), CEEX project, sectoral project.

A direct relation between the research lines, projects developed and results are presented in the table below.

Research Direction	Projects	Project Outcomes
E5.1 Development of innovative and sustainable technologies/ biotechnologies for advanced removal of nutrients, priority substances from water/ wastewater	17 completed projects, financed as follows: - 3 projects from external, public funds (18%) - 9 projects from national, public funds (53%) - 5 projects from private, national funds (29%)	- 32 technologies - 16 models - 7 studies - 15 products (technical projects, installations, methodologies) - 2 patents - 15 articles (6 published in journal with relative AIS[iii]) - 50 communications - workshops, brochures
E5.2 Promotion of alternative technologies for revamping wastewater treatment plants	4 projects in progress and 5 completed projects, financed as follows: - 4 projects from external, private funds (44%) - 2 projects from national, public funds (22%) - 3 projects from national, private funds (34%)	- 2 technologies - 5 models - 3 studies - 3 products (technical projects) - 1 article (published in journal with relative AIS) - 2 communications
E5.3 Eco-technologies based on physical-chemical and biological processes for contaminated soils remediation	2 projects in progress, supported from external, public founds	- 2 technologies - 1 model - 2 studies - 3 communications
E5.4 Organic waste treatment technologies for their recovery	4 completed projects, financed from national, public funds	- 3 technologies - 3 models - 1 study - 2 products (installations) - 2 patents - 5 articles - 6 communications - workshops, brochures
E5.5 Principles of eco-efficiency and industrial symbiosis applied in corporative development approach of industrial operators	4 completed projects, financed as follows: -2 projects from public, external funds (50%) - 2 projects from national, public funds (50%)	- 3 models - 7 studies - 8 products (methodologies) - 3 articles - 7 communications - workshops, brochures

The ***technological transfer activity*** was carried in the frame of both national/international projects (CEEX and PNCDI: CEEX - Biochem, Proaqua, Integr-it, PN2 - NPTT, Sectoral projects, ESD project), which involved having industries and water-sewer companies/operators as partners, and within projects directly contracted with economic units (Terapia, Electrica Design, Petrom, Apasco, TASM). In case the industries were part of the project consortia they were also beneficiaries of the project specific technical documentations (technologies/technical projects treatment installations/methodologies). There is high interest for deepening the existing research directions and opening new directions through applications in national and European programmes (5 projects in 2011), projects self-financed (2 ongoing) and participation at scientific events or workshops for programme launching/promotion.

3.5.3. Human resources

The quality of human resources, emphasized by the level of specialization and expertise attested with scientific recognition, ensures the competitiveness of the research team (22 persons) in a complex area, as the environmental technologies are. The team consists of ***16*** *high education graduates - UEL (2 – CS1, 1- IDT I, 1-IDT II, 5 – CS3, 1-IDT III-Architect, 6 – AS)* and **6** persons with high school education level - HSEL (auxiliary personnel). **43 is the average age** of E5 UEL team (7 women), out of which 3 are PhD, 3 PhD students, 5 Masters and 2 Master students.

*The **multi-disciplinary aspect*** is an important strength of the E5 team: technologist, biologist, biotechnologist, developing engineer, chemical analyst, making thus possible to approach complex research themes within the frame of environmental

technologies, with unitary/integrated solutions, based on physical-chemical and biological methods and also testing on pilot installations or in the field. In order to maintain and improve the human resource professional level, taking also into account the personnel mobility, all the available possibilities are used (PhD and master, training courses, participation at national and international symposium, summer schools , a.s.o.)

3.5.4. Infrastructure

The infrastructure needed for competitive performance of research activity has had a gradual evolution on three main directions:

- *research equipment* procurement for performing experiments/tests in order to establish sequential water/wastewater and soil treatment flows, with financial support of CEEX, FP7, Eurostars projects, own sources (4 pieces of equipment), and POS CCE (2 pieces of equipment);
- procurement of *pilot installation* for physical-chemical and biological water treatment, in various configurations, operated in the field (continuous flow), for completion of treatment flows and demonstration of technology performances to the beneficiary. This was completed within the frame of CEEX projects (4 installations) and, the majority of it, in the frame of POS CCE project (14 installations);
- *high-performance analytical equipment* for investigation of organic/inorganic pollutants along the water treatment flow, soil bioremediation, sludge treatment, in order to diminish the time required for technology development, and also for improving the research performance through variation of operating parameters, completion of unitary treatment/remediation technologies. For this CEEX funds, Sectoral funds, self-financing (11 pieces of equipment) and POS CCE funds (6 pieces of equipment) were used.

The highest level of usage is registered for analytical equipment necessary for technological research activities and services (direct contracts) and also for collaboration with other laboratories inside the institute (> 80%). The recently purchased equipment (POS CCE) will be used for future technological research. Furthermore, new equipment procurement is planned for 2012, in order to upgrade the existing analytical equipments (3 pieces of equipment) and for the oxidation equipment completion (2 pieces of equipment)

3.5.5. Objective for future development

The development objectives of the E5 research team, on short and medium term, have the following targets:

- valorization of the opportunities offered by bi- and trilateral projects with Switzerland, Ukraine + Moldova (2012 - minimum 3 project proposals) and those offered by collaboration with foreign companies (minimum 4 projects in the next 2-3 years);
- participation, via partnership with universities, institutes of the Romanian Academy and economic units to national research programs (5 submitted proposals in 2011);
- improving of technological transfer by increasing the number of direct contracts with industries (2-3 collaboration contracts per year) and also promoting this activity to partners in on-going or future projects consortia (minimum 3-4 in the next 3 years);
- extending participation in partnership to European research programs (2011 - 2 project proposals, minimum 5 proposal in the next 3 years);
- improvement of scientific production (articles published in ISI quoted journals, with relative influence factor >1- minimum 3/year; patent of original technologies – 1-2 patents requests/year).

3.6. Activity report of team E6 - Management Systems

The "Management Systems" team was created in early 2000 in response to the updated national and international requirements of implementation of ISO standards in the field of quality and environment management systems and the necessity to circle the whole activities of the institute in connection with the environmental protection management.

Diversification of activity profile of the team in the last 5 years saw a 200% dynamic. In the beginning there were two areas (quality and environmental management systems), then 4 more have been added: the occupational health and safety management system, the food safety management system, the mathematical techniques for support decision in the environmental risk assessment and environmental management and the audit analysis to identify hazardous substances.

3.6.1. Research directions and thematic subdivisions

1. **Development of tools and new techniques for processing and interpretation of data on environmental impact and ecological risk**

1.1 Multicriteria analysis techniques (data processing and interpretation) based on analytical hierarchy process applied in ecological impact / risk assessments

1.2 Multicriteria analysis techniques (data processing and interpretation) based on Dempster Shafer theory and Evidential Reasoning algorithm applied in ecological impact / risk assessments

1.3 Multicriteria analysis techniques (data processing and interpretation) based on rough set theory applied to ecological impact/ risk assessments data mining processes for pattern discovery in large datasets of surface water body.

1.4 Multicriteria analysis techniques (data processing and interpretation) applied in life cycle assessment of products

2. Environmental analysis related to the identification hazardous substances

2.1. Dangerous and priority dangerous substances screening discharged into sewerage water systems or directly into the surface water body for hazards pre-assessment.

3. Courses, procedures and tools for training and assessing of professional competence in environmental protection

3.1 Training in management systems

3.2. Formation of personnel in quality and the environment field through the development and authorization of four training programs: Auditor in quality field - COR code 242303, Environmental Auditor - COR code 242 305, Manager of Quality management systems - COR code 242 302, Manager of environmental system - code 242 304 COR

3.3 Assessment of professional competencies for two occupations in environmental protection: manager of environmental system and environmental auditor

3.4 Elaboration of management standards and occupational standards

4. Design and implementation of management systems (quality, environmental, OH&S, food safety)

4.1 Design and implementation of management systems in industrial organization and public administration

4.2 Environmental analysis

4.3 Audits of management systems

4.4 Risks assessment of injury and occupational disease

3.6.2. Projects and results

In the period 2007-2011 the team as a partner in consortia with important national and international partners applied for **8 projects**, one in coordination. Four projects, with the highest value have received funding (50% success rate). The productivity was of 2 projects/member team and 2.67 projects/researcher)

Directions	Projects	Project Results
Development of tools and new techniques for processing and interpretation of data on environmental impact and ecological risk	11 projects	-6 articles one in ISI journal -1 pending patent -3 studies -1 model -2 methods -1 methodology - 11 communications
Environmental analysis related to the identification hazardous substances	Projects financed from national private funds Sept 2010-sept 2011 10 projects for industrial organisations and public administration	-5 studies -20 services - Technological transfer to the beneficiary -1 communication
Courses, procedures and tools for training and assessing of professional competence in environmental protection	Projects financed from public international funds Mar 2009-Feb 2011 Development and approval of a Centre of Competency Assessment and Certification of Adult Training in the Environmental Protection Sector -*PROMEDIU POSDRU/20/1.4/G/9271*. Project in partnership with: Employers association of producers and users of industrial equipment for environmental protection - UNIMED (CO), VAPRO-OVP BV from Holland and Adult Vocational Training Council CNFPA	-2 communications -1 study -1 operational documentation of the centre -1 set of evaluation tools -3 events -6 graduation certificates -10 evaluation files Through this project, two evaluators of professional skills of the team were certified. These evaluators will be the core of assessment centre that will be develop in the institute
	Oct 2009-on going *Qualifications and Competence Certifications for a Sustainable Development / PRO COMPETENT - POSDRU/58/1.4/S/32519*. Project in partnership with: Sectoral Committee for professional training in Environmental Protection-CSFPM (CO), Scottish Qualifications Authority -SQA, Athens network of collaborating experts-ANCE, Association of environmental auditors and evaluators from industry - ECOEVALIND and SC EURO-LINK CONSULTANTS SRL	-2 studies -2 occupational analysis -1 occupational standard -7 events -2 certificate Through this project, the institute will set up and authorize an assessment of professional competences centre for one occupation: environmental responsible. This centre will be developed for other occupations and will be a source of income for the institute
	Apr 2010-on going *Developing the capacity of the Sectoral Committee for the professional training in the field of Environmental Protection, in support of improving the quality of continuous professional /training in Romania / SOMEDIU - POSDRU/79/1.4/S/53587*. Project in partnership with: Employers association of producers and users of industrial equipment for environmental protection UNIMED (CO), Scottish Qualifications Authority -SQA, Athens network of collaborating experts-ANCE, Environmental audit and evaluation Employers - ENVIROEVAL and SC EURO-LINK CONSULTANTS SRL	-1 study -1 occupational analysis -1 resource centre for CSFPM -5 events -2 certificate Through this project will form five experts in the development of occupational standards and five experts in the assessment of occupational standards. These skills will exploit to develop new occupational standards to assess skills in the assessment centre of institute
Design and implementation of management systems (quality, environmental, OH&S, food safety)	Projects financed from national public funds Nov 2008-Dec 2011 *Making poultry products using new recipes, structured of raw materials obtained in ecological conditions -AVIECO*. Project in National Research, Development and Innovating Program-PN II in partnership with National	-3 studies - transferred to CO -1 course support – transferred to the partner SC Auger Petrus SRL -2 food safety management systems - transferred to CO and to partner SC Auger Petrus SRL

	Research-Development Institute–for Biology and Animal Nutrition Balotesti-IBNA (CO), Institute for Food Bioresources -IBA, SC Auger Petrus SRL	-2 communications
	Projects financed from own funds Apr 2006-Jan 2011 12 projects for industrial organisations and public administration	-7 studies - 13 services - Technological transfer to the beneficiary - 8 communications -1 book

3.6.3. Human Resources

From 2008 to the present team consists of **4 people of which 2 female** (3 researchers / certified - CSIII, specialized in chemistry, metallurgy, electro-techniques, including one Ph.D. in engineering sciences) and 1 technician (auxiliary staff). The **average age of staff is over 45 years (53 years).** This is not a weakness because implementing of management systems to operators in all fields requires extensive experience to understand the processes taking place in the organization. Develop of team work area was done in parallel with continuous improvement of staff training. Staff participated in training courses organized in research projects or funded from own sources.

The certified staff has the following expertise:

- Environmental Management Systems Manager
- Quality Management Systems Manager
- Occupational Safety and Health Systems Manager
- Specialist in food hygiene (HACCP) management Systems
- Auditors for all management systems
- Environmental Auditor
- Internal evaluator for the risks of injury and occupational disease
- Evaluators of professional competence

3.6.4. Infrastructure

The infrastructure proper for activity: Computers, peripherals and office equipment necessary for writing and duplicating work papers, used at a rate of over 75%.

The equipment is modern and does not require improvement.

3.6.5. Perspective/objectives for future development

The following objectives were established by team E6 for future development:

1. Maintaining partnerships in order to participate in further competition in the research programs funded from national and European public founds-min 1/year.

2. Minimum 10 projects with economic units;

3. Taking advantage of expertise obtained by authorizing several occupations in the environmental field for the center of assessment of professional competences that will be set up in institute - min 2.

4. Approach of new areas of activity - min 2: management of social responsibility, stakeholder involvement in sustainable development of organizations.

5. Increasing visibility team with a greater number of articles published in publications indexed in international databases such Thomson Reuters (ISI), Scopus, Elsevier, Ulrich, etc - min 1/year

3.7. Activity report of team E7 – Subsidiary Timisoara

The research team E7 (subsidiary Timisoara Branch) carries out R&D activities and it also provides environmental protection services in the Western part of Romania. The geographical position gives opportunity of involving in international partnerships with research entities and universities from Hungary and Serbia.

The Timisoara Branch has been in the market since the institute foundation (1979) and it has been at the core of the institute development. This core included teaching staff of Faculty of Industrial Chemistry within the "Politehnica" University of Timisoara

3.7.1. Research Directions

Over the years the activity of Timisoara Branch diversified and at present it represents a replica at smaller scale of INCD ECOIND Bucharest. Most of institute activities domains can be retrieved at our branch, as follows:

- **Fundamental and applied research** in water treatment for drinking purposes, wastewater treatment, soils and polluted sites remediation, recovery of some waste categories and natural material for ecological remediation;
- **Assessments** regarding the **environmental** factors **quality** and the impact of economic activities upon the environmental factors quality
- Studies regarding the changes of environmental factors quality and industrial emissions

3.7.2. Projects and results

The Timisoara Branch has carried out research activities based on various funding allocated for research entities: **national, regional and local public sources**, **international sources and private sources** so far and it strives for fulfilling its goals in the future

According to the European research strategy, there were done activities to get funds from international sources, research and innovation programmes of European Union. Timisoara Branch has submitted **3 project proposals** within the Cross-Border Cooperation Hungary – Romania and **one project** - CRISKOR has been awarded financing and now it is under deployment (**the success rate is 33%**, over the national average).

From **national public sources of financing 6 projects** were deployed within the National Programme CDI PNCDI II 2007-2013 and Timisoara Branch was Lead Partner for one project and Partner for the others 5 projects.

The productivity of E7 was of 1.25 projects/member team and 2 projects/researcher.

In the domain of **environmental impact assessments**, the team has experts with a high level of expertise and long experience. In addition, the team has the advantage of a fully fitted laboratory and thus there are conditions for accomplishing tasks at a higher level of quality.

In the reporting period, **58 projects** were carried out in environmental protection domain having beneficiaries in the first instance companies from various industries (chemistry, petro chemistry, ferrous metallurgy, civil engineering, food industry, ceramic), agriculture and also local communities represented by mayors or companies that provide services to local communities (especially in drinking water supply, wastewater treatment, waste management and urban and territory development plans). Given these achievements, the team of Timisoara Branch has proved its ability in building strong ties with industry and contributes to the improvement of environment and life conditions of local communities.

Project & contract results

The long experience of the scientific staff in the above mentioned domains is a guarantee for the expertise required by the achievement of works characterised by high scientific value at national and international level. Table below shows the number, diversity and quality of the research projects.

years	2007	2008	2009	2010	2011	Total
Project results	**30**	**36**	**39**	**28**	**25**	**158**
Technologies	-	3	-	-	3	**6**
Models	4	6	3	3	-	**16**
Environmental Studies	10	15	12	12	9	**58**
Products	2	-	-	2	1	**5**
Patents	-	-	2	1	-	**3**
Articles + Communications	14	12	22	10	12	**70**

There were **70 papers** (37% of the total) out of which **5 scientific papers** published in journals with non-zero relative Article Influence Score and **9 articles** published in ISI journals. Among the prestigious journals we count **Revue Roumaine de Chimie, Revista de Chimie, Journal of Environmental Protection and Ecology, Environmental Engineering and Management Journal, and Electroanalysis**, which is especially mentioned because it **has Relative AIS = 1.3111**.

The research projects carried out within CEEX generated phyto-remediation technologies for contaminated soils in 2008 (REMSOL project and MULTIPRAT project). Technological solutions for the treatment of surface waters, for the treatment of industrial wastewater and for the phytoremediation of the polluted industrial sites were generated upon the completion of the projects within the NUCLEU program. These results constituted very useful starting points for the advanced researches on specific fields.

Other important results of the Timisoara Branch are the **5 specialty books** written during the studied period, as well as the registration of three invention patents in the field of surface and ground water treatment and in the field of producing new materials for wastewater treatment.

In the field of environmental assessment, about **60 studies (**around 43%) resulted that are necessary for a wide range of economic agents: impact studies, environment assessments, risk and contaminated site assessment studies, studies regarding the evolution of the industrial emissions and of the environmental factors quality.

New research directions

In order to find ourselves in the avant-garde of research in the field of environment protection in Romania, new research fields have been approached in the last few years, which shall be valued a lot more within the following period:

- The remediation and the phytoremediation of the soils and the polluted sites
- The specialisation in the electrochemical and photo-catalytic treatment processes
- The revaluation of some waste and natural materials in the decontamination of soils and waste water
- The strategic environmental assessment (SEA procedure) in the field of Planning and Programs

The team's management

Because the environment problems have a multidisciplinary feature, they have been approached in collaboration with research teams from other scientific fields: agronomy, electrotechnics, and universities with various specialisations. The studies in the field of environment financed from private sources have required a multidisciplinary approach many times, as well as the development of the entrepreneurial ability of the team, leading to collaborations with experts in the fields of geology, biology, urban planning, etc. As examples, we may mention the complex studies on the assessment of the contamination level of several industrial sites, the environment assessments for planning and programmes.

An important advantage of the team that was quite well valued in the past is given by the fact that it can benefit from the collaboration with the parent-institute as part of complex projects or when services that the branch cannot offer are necessary.

3.7.3. Human resources

The competitiveness of the team (**8 persons**) is ensured by the competence of the **5 research** personnel characterised by a qualification leading to a high level of expertise in the respective fields: the wastewater treatments (2 persons), the remediation of the polluted soils (2 persons) and the environment

assessments (2 persons). One member of the team attended a research internship abroad at the Ca' Foscari University from Venice. The ratio between the research personnel and the technical one is 5:3, well balanced for an efficient performance of the activity. Five of the eight employees are women. A disadvantage of the research personnel could be the age, between 45 and 56 years, imposing the inclusion of young people with higher education in the future development plans of the team.

3.7.4. Infrastructure

Valuing the opportunities offered by the projects carried out within the CEEX Programme, the laboratory has been provided with performing research equipment, used in all the activities of Timisoara Branch. With the help of the analytical chemistry devices - UV spectrophotometer, AAS, IR, TOC and N, other auxiliary equipment - the team has the ability to approach new research fields and to provide services that are more complex to economic agents. The electrochemistry equipment allows the team to carry out more advanced research activities.
The branch proposes to acquire for its future development other auxiliary laboratory equipment (Jar Test system, turbidimeter, centrifugal machine), as well as an electrocoagulation equipment to match the laboratory scale.

3.7.5. The future development

Based on the elements presented in the report herein, the Timisoara Branch proposes to revaluate the existing opportunities in the near future:

- Participation in joint consortia with universities from the region to apply to national research programs - 2-3 applications/year;
- Participation in partnerships within European research programs - 1-2 applications/year;
- Greater attention to the quality of the publications meaning the increase of the scientific level of the research results. Focus on publications with a higher scientific level - at least 1 publication ISI/year;
- Maintaining and strengthening the position on the market of field assessments;
- The RENAR accreditation of the laboratory shall lead to the alignment to the regulations in the field, as well as to the increase of the client portfolio;
- The use of the geographical position of the Branch by applying Cross-Border Regional Programs with Hungary and Serbia, as well as of other programs;
- The increase of the research staff by employing 1 or 2 young persons with higher education, in the next 2 years, if the economic status of the branch allows it;
- The purchase of infrastructure elements: Jar Test system, turbidimeter, centrifugal machine, electrocoagulation equipment to match the laboratory scale.

3.8. Activity report of team E8 - Subsidiary Rm.Valcea

Subsidiary Rm. Valcea worked in this branch of environmental researches for 29 (twenty nine) years, within the INCD ECOIND Bucharest structure, from the beginning providing technical assistance in order to implement technologies developed by INCD ECOIND for Oltenia geographical area.

The subsidiary answers to the needs of control of industrial pollution in the chemical platform Rm.Valcea and other industries of Oltenia area, such as SC OLTCHIM SA, SC USG Chiech, SC Protectchim SA, SC Logiserv SRL(Tank Cleaning), Municipal wastewater treatment plants Ramnicu Valcea and Dragasani, SC Electrocarbon SA Slatina, etc. SC Oltchim SA is a top leader in the worldwide chemical industry, being number one in Central and Eastern Europe on Chlorosodics, Polyeter Polyols and Propylen Oxide markets and the second major PVC producer.

USG Chiech is the producer of Soda by Solvay proceeding.

3.8.1. Main activities

The main activities of the branch in the analyzed period are:

- **Industrial pollution assessment** - specific environmental studies and documentation according to methodologies and legislation.
- **Technical assistance** to verify/ implement remediation technologies developed by INCD-ECOIND for Oltenia area.
- **Industrial pollution monitoring and control** - sampling and physical-chemical characterization for environmental factors: water (surface and groundwater, municipal and industrial wastewater), soil, sediment, waste and interpretation the results on legislation.

3.8.2. Projects and results

E8 Team projects carried out directly with businesses especially in Oltenia area, are based generally on **annual contracts**, mainly beneficiary being SC OLTCHIM SA, a representative unit of organic and inorganic chemical industry, which generates extremely complex problems of pollution.

The types of work carried out during 2007-2011 by our team includes pollution control to pollution sources, evaluation and operation of local wastewater treatment plants and final plants, impact assessment of pollution control on the surface water, soil and groundwater.

The same types of works have been performed for the operators in industrial platform Valcea, but also for other units in the region of Oltenia, such as SC Electrocarbon Slatina, Branch Mining Rm. Valcea, SC OMV Petrom SA, SC APAVIL SA, Dragasani Hall.

E8 Team has conducted numerous investigations on the quality of sludge and waste and their acceptance criteria for landfills.

The team members have approached the characterization of drinking water and of water destined for potabilization, in collaboration with laboratories INCD ECOIND.

Also team members had a number of **4 projects** within the Nucleus Program and they were part of a team project financed from structural funds, the project SOMEDIU – for training in environmental protection in support of improving the quality of continue vocational training in Romania.

During 2007-2011 were performed **12 evaluations of environmental studies** for different economic agents on which those agents have obtained environmental agreements. There were also made **20 effluents monitoring** and **69 studies** of environmental monitoring and control pollution for economic units.

Beneficiaries who have applied our works on environmental research and environmental assessment were: SC Oltchim SA, SC USG CIECH, SC APAVIL SA, Buces Hall, Martinesti Hall, Romos Hall, Dragasani Hall, SC

OMV Petrom SA, SC Protectchim SA, Branch Mining Rm.Valcea, SC Electrocarbon SA, MI Petrogas Service Romania SA etc.

Results of the research activity:

In the below table are presented the results of the Subsidiary Rm.Valcea:

years	2007	2008	2009	2010	2011	Total
Total project results	**12**	**18**	**33**	**40**	**37**	**140**
Services	4	3	16	26	20	69
Published papers [1]	2	3	4	5	6	20
Studies [2]	6	12	9	6	8	41
Others - in house works	-	-	3	3	3	9
- books	-	-	1	-	-	1

[1] *Published Papers*

- 8 scientific papers published in extenso at volumes conferences

- 2 scientific papers published in ISI journals

- 10 scientific papers published in abstract at volumes conferences

[2] *Impact studies, environmental supervision, Nucleus Program, SOMEDIU*

Publications

The research workers of subsidiary Rm.Valcea participated at many scientific manifestations and published **8 scientific papers** in extenso at volumes of international conferences, **2 scientific papers in ISI journal** and **10 scientific papers** in the abstract at volumes of Conferences. One of the research workers published a book in Romanian language, referring to the wastewater treatment methods by sonochemistry.

3.8.3. Human resources development

Total number of persons who works in the Subsidiary Rm Valcea **is 6,** from which 3 with higher education, women (a chemist CS III, a biochemist CS III and a chemist engineer CS) and 3 technicians (two women and one man). There are preoccupations for well – trained professional. The two young research workers have master studies, also they are doctoral students. The **average age of the team is 44 years**.

3.8.4. Infrastructure

The Subsidiary has a very old equipment, at this time meeting the needs of pollution control and monitoring requirements in the aria; for more complex analysis the works are performed at laboratories of INCD ECOIND Bucharest.

Team capabilities to access projects in national and/or international programmes that would be able to achieve renewal of equipment were limited. According to the environmental market evolution in the activity area, would be possible, in the future, the purchase of a gas chromatograph and a UV-VIS spectrometer for the Branch.

Conclusions

The Subsidiary wishes to continue environmental research in Oltenia area, is recognized as the environmental assessor, with good competences in environmental monitoring.

Members of the Subsidiary must pay attention to improving the quality of research and publications, the publication of articles in scientific journal with a good quote (at least 3 articles in ISI journals).

4. Representative project

Within this section is presented a representative project for the performance, visibility and socio-economic impact of INCD ECOIND. This project was indeed a major one for our institute from many point of view (budget, duration, complexity, responsibility) being between the first RDI projects financed in Romania from Structural Funds for development of RDI public infrastructure, but with many expectations from our side. This project was a **green-field type project**. The project is presented below as a complete cycle of conception, development, implementation and exploitation during 2007-2011.

Title: „**Development of INCD ECOIND research infrastructure in order to extend and diversify research works in the field of industrial ecology**"

Operational programme:	Sectoral Operational Programme Increase of Economic Competitiveness
Priority Axis:	PA2 Research, technological development and innovation for competitiveness
Key area of intervention:	D2.2 Investments in RDI infrastructure and related administrative capacity
Operation:	O.2.2.1 Development of the existing RDI infrastructure and the creation of new infrastructures (laboratories, research centres).
Duration:	01.03.2009-29.02.2010 (still on-going project)
Budget:	32.846.412 Lei + VAT (9.384.689 EUR + VAT calculated at an exchange rate of 1EUR=3.5LEI)

Project's general objective: expanding the scope, diversification of and opening new research directions in industrial ecology, by developing a new infrastructure for the National Research – Development Institute for Industrial Ecology, by providing the research departments / laboratories with modern and performing equipments / installations / apparatus / intangible assets

The project objective is referring to extension, diversification and increase of institute's research capacity in the field of **industrial ecology**, considered a relevant and viable domain in both European strategies and 2007-2013 RDI strategy of Romania, where is included in the 9 thematic directions with role in the increase of economic competitiveness.

The project aim is to develop, on consecrated research domains of the institute, some new top and up-to-date research directions: environmental and impact and risk assessment induced by priority and priority hazardous compounds upon the environment, greenhouse gasses emissions control, industrial symbiosis, innovative , green technologies (biotechnologies, solar technologies) for water treatment, efficient techniques for soil remediation .

These new directions are included within the priority scientific objective of the institute: consolidation and orientation towards top environmental research domains and increase of value added scientific productivity

The achievement of general objective is finalised through the following specific objectives:

Projects specific objectives:

SO 1 - **Development of the existing research infrastructure** (*utile surface: 3.026,70 m^2*) and **setting-up new laboratories** that would open-up new excellence research directions on top and niche subject matters and would provide innovative research applications, according to the opportunities and demands of the domestic and external market.

SO 2 - **Expanding the level of research labs and departments' equipment** by acquiring micro-pilot /pilot modern cutting-edge equipments /devices / plants (*24 for the existing and 30 for the new laboratories*) with advanced national and European performance features on purpose of ensuring a competitiveness level similar to the peer institutions in the E.U.

SO 3 - **Enhancing the research and development capacity** to consolidate institute's position in the relevant national and international scientific community, as well as long-term European-level competitiveness. (*10 international projects during the period of project's implementation*).

SO 4 - **Expand the scope of business and stimulate cooperation** with universities, other R&D institutes and companies in terms of research, development and innovation, thus allowing for clustering the national and regional capabilities in specific technological networks and platforms (Balkan network B.EN.A. and Water Supply and Sanitation Platform) that would become the grounds for bringing added value and additional knowledge.

SO 5 - **Improving quality and range of research services** (*at least 3 new services/year*) through development of 15 new research directions that can be directly applied in economy to stimulate innovation demand from the business environment.

SO 6 - **Diversification of the personnel's qualifications** and **attracting the researchers from abroad** that have international experience, obtained sound results and have proven scientific excellence potential, by creating new jobs and providing proper conditions for their reintegration in the Romanian research area (*by cresting 13 new jobs on the period of project's implementation*).

SO 7 - **Enhance and strengthen the administrative capacity** to ensure institutional development and efficient management of the R&D projects, through procurement of IT equipments and specific software (*documents' management, projects management*).

4.1. Project's conception

- A SWOT analyse at institute's level, was performed in 2007 taking into consideration the following main aspects: research directions, human resources, infrastructure, presence, partnerships and visibility within Romanian and international scientific community, research results transfer to economy, market position and accession of extra-budgetary financing sources.
  The **conclusions** of SWOT analyse were:
  - dynamic **research themes**, in accordance with market's tendencies and needs, still **needs diversification** towards specific niches;
  - competent and devoted **research personnel**, an adequate ratio between research personnel and support staff, average age above 45 years, **need for young researchers, need for support staff**;
  - adequate endowment, relatively uniform distributed, in accordance with labs/compartments needs, diversification need, need for performance growing; **the institute doesn't own a infrastructure**, the existing space doesn't offer optimum conditions for research activity and for some research works traceability;
  - a concern regarding results dissemination, **insufficiently valorification of results** and **partnerships opportunities**, mainly for international level;
  - research focussed on market needs, there is **a need for development of new services** for the economic environment.

  INCD-ECOIND is the only environmental research institute in the country that displays a global approach on all issues related to environmental issues of economic units. That was remarked by the external audit performed for institute's accreditation in 1999.

- Based on these conclusions, a need to apply within a programme that offers financing opportunities for diversification and development of research activities, together with the development of research capacity, through construction of new and modern infrastructure with labs endowed with performant and competitive equipments, similar with top labs in the field, resulted.

During the major project implementation a **series of projects (8) financed from external funds (part of them connected with the new research directions initiated within the project) and partnerships (4) were initiated**. MSc and PhD running thesis are developing new research directions initiated by the project. The achievement of projects objectives is representing a certitude for instate growth in terms of personnel quality, technical endowment and visibility.

4.2. Project's Development

- In order to develop the application, the following steps were performed:

  - confirmation of main research directions to be developed in the **6 existing labs**, based on environmental research tendencies and economic units needs;
  - assessment of diversification of research works within the activity domain: pollution control, assessment and abatement, using specific research directions that are responding to domain's evolution and to the economic environment requirements.
    15 new research directions, with value added potential for environmental research, and possibility to be applied by the economic units, were established;
  - setting up the needs to develop **new labs in relation with the new research directions**. **13 new labs,** that together with the existing ones will constitute the new institute's structure of research departments and laboratories, were envisaged;
  - in order to sustain the new research directions, the modernisation of existing labs and the development of the new ones, based in researchers proposals a need for **diversification / upgrade / development** of the endowment with apparatus, equipments, pilot and micro-pilot lab installations for measurements and tests in the field and within laboratories was established. A list of **54 new equipments / installations** for the existing and new labs was set up, from which **9 equipments with the value above 100.000 EUR**,
    Procurement of two auto-laboratories for field measurements for water – soil, and respectively air was estimated.Along technical endowment, the need for both **research software and logistics** (computers and peripheral components, copiers, printers) was assessed.
    In the same time an **assessment of software / logistics for institutional development and increase of institute visibility** (web page, brochure) was performed.
  - Within the IMPACT programme (support for Romanian RDI system in order to develop project proposals for accession of Structural Funds 2007-2013) financed by ANCS (National Authority for Scientific Research), a feasibility study (FS) on technical and financial assessment of the new research infrastructure was developed.
  - Based on FS and institute's development objectives proposed by the institute, the application form was developed and submitted to the 2008 competition (call launched in December 2007, submission deadline march 2008) of SOP ICE programme – Priority Axis 2 – Operation 2.2.1. - Development of public RDI infrastructure, dedicated to increase of research competitiveness.

4.3. Project's Implementation

Our project proposal obtained 29 points (from max 30) and first selected for financing on the thematic domain ENVIRONMENT. At that call only 4 projects were financed on this thematic domain within the SOP ICE programme, out of 13 proposals submitted. That shows the relevance of our proposal at national level for RDI system.

The project started at **01.03.2009** (in present being under implementation)

Project's main objectives/indicators

Progress status

Project Result Indicators (29.02.2012)	**Planned**	**Completed at 30.11.2011**
New research infrastructure	1	1
Modernised RD laboratories	6	6
New RD laboratories created within the project	13	13
Total RD equipments, from which	54*	41
RD equipments above 100.000 EUR	9*	1
Project Impact indicators (28.02.2017)		
New research directions	15	15 initiated

RD Jobs preserved	137	129
Jobs created	13	7
International projects in which the infrastructure will be involved	10	8

* - *the procurement contracts are signed for all equipments*

- **The new infrastructure** (the building) **was finalised in 2011**, research activity was completely relocated to the new building in the first half of November 2011, official opening was held on 15.11.2011;
- The main proposed research directions were initiated during the project and will be developed on medium term, within projects implementation period, are in accordance with the existing research directions and are referring to:

Environmental pollution control

1 design of new analytical control techniques to assess the level of pollution with chemicals considered hazardous for water, sediments and soil;
2 design of new eco-toxicological methods /tests to assess the degree of toxicity of chemical on soil's microorganisms;
3 development of a testing and assessment strategy relating to the risks generated by environmentally-hazardous chemicals (support of REACH Regulation);
4 assimilating /implementation of specific techniques and methods for determination of the bacteriological load of environmental factors – air, water, soil /sediments.

Environmental pollution assessment

5 development of a modern methodology for characterization /classification of solid and liquid waste and assessment of the risk generated by industrial waste disposal on the environment;
6 monitoring the greenhouse emissions and determining the specific parameters of solid and liquid fuels;
7 development of a complex system for identification of oil pollution sources, based on methodologies specific to legal environment analysis;
8 drafting integrated methodologies /models for assessment of the ecological state of the surface water resources taking into account the combined effects of man pollution sources and of climate;
9 assessing the environmental impact of certain emerging economic sectors.

Environmental technologies for pollution abatement

10 design of environmental risk assessment techniques, methodologies for industrial activities;
11 development /promotion of innovative and sustainable technologies /biotechnologies for : removal of xenobiotics from water sources; nutrients and hazardous /priority hazardous substances from industrial and municipal waste water; treatment of organic waste / sludge in order to be used as energy resources and fertilizers; remediation of soils polluted with heavy metals and hazardous organic compounds;
12 development /consolidation of a regional network dedicated to industrial symbiosis to reduce consumption of resources /energy and waste valorification;
13 development /promotion of solar technologies – clean technologies with low energy consumption;
14 development and promotion of design criteria and technologies for alternative waste water treatment systems – chemically and energetically self-sustainable passive systems that can be applied in the mining sector after restructuring (closing /after closing of mines) to ensure protection of water quality.

Environmental and quality management systems

15 elaboration of methodologies for development and implementation of the European management and audit systems (EMAS II) and of new management systems (health & safety, food safety).

- Adequate space and endowment conditions were created for the 13 new laboratories, centres, compartments within the existing research departments.

Within the existing departments, those labs are:

Pollution Control Department (DCP):

- Laboratory for evaluation of ecological risk (LERE) - direction 3

- Bacteriological control laboratory (LCB) - direction 4
- Assessment-monitoring greenhouse effect gases (LGES) - direction 6
- Characterisation / classification of liquid and solid waste (LDSL) - direction 5
- Judicial environment analysis (JUDMED) - direction 7

Department for Assessment – Monitoring Environmental Pollution (DEMPM):

- Process investigation laboratory (LIP) - directions 9, 10

Department Environmental Technologies and Technology Transfer (DTMT):

- Biotechnology laboratory organic residual biomass exploitation (LBVB) - direction 11
- Centre for eco-efficiency and sustainable development (CEDD) - direction 12
- Excellence centre for green technologies (CETV) - direction 13
- Process water laboratory (LAP) - direction 11
- Laboratory for processing waste / sludge, soil cleaning (LPDNS) - direction 11
- Technological Development Compartment (CDT) - directions 11-14

Management Systems Compartment (SMC):

- Compartment HACCP-OHSAS - direction 15

Part from new research directions (1,2,8,9,10,11) are developed in the existing departments, modernised through equipments' procurement.
During project implementation, some national / international projects on themes corresponding to the new research directions were initiated and will be extended in the future.

- The project was designed based on professional growth of institute's personnel and improvement of the average age of attested researchers.
  Although the efforts for young professionals' recruitment are obviously, the economic conditions are creating problems related to the accomplishment of indicators related to human resources.

Conclusions

It is appreciated that completion of this project has a major impact upon the institute and its evolution:

- *EXCELLENCE IN RESEARCH - a new infrastructure, designed for research activities, endowed with state of the art equipments, means optimum conditions for performance and excellence in research;*
- *VISIBILITY - developed research directions and laboratories, in accordance with European tendencies in the environmental research field, are ending up in an increase of institute's competitiveness, better visibility, better conditions for national and international partnerships;*
- *COLABORATIONS with INDUSTRY - research and services dedicated to economic units will be developed, in such a way that economic impact and market position of the institute will improve continuously;*
- *ATRACTIVENESS for HUMAN RESOURCE - created research conditions are more attractive for the existing researchers and young graduates, allowing the professional improvement, the researcher career being exposed in a positive light.*

As a result of this project, the institute is strengthening its position as leader on environmental research market in Romania, new opportunities for excellence research works both at national and international level are opening.

Taking into account the above presented facts, we considered this project as a major one for INCD ECOIND during the period 2007-2011, being representative in terms of performance, visibility and social-economic impact for the institute.

Legend

A	
a.s.o.	and so on
AAS	Atomic absorption spectroscopy, a methodology of analytical chemistry
AF22M	UV Fluorescence Sulfur Dioxide (SO2) Analyzer
AIS	Article Influence Score
ANCS	National Authority for Scientific Research
AOX	Antioxidant
AS	Assistant Researchers
C	
CD	Research and Development
CDI	Research Development and Innovation
CEEX	Research of Excellence Programme, 2005-2008
CO	Carbon monoxide, is a colorless, odorless, and tasteless gas that is slightly lighter than air
CO	Coordinator
COR	Classification of Occupations in Romania
COST	European Cooperation in Science and Technology programme
CS	Scientific Researcher (various grades-CS3, CS1);
CSFPM	Sectoral Committee for professional training in Environmental Protection
E	
E.U.	European Union
ECD	Electron capture detector, a chromatography scientific device
EEA	European Economic Area-Grant Programme
EPA	Environmental Protection Agency
ESD	Environmental Sustainable Development (Cooperation Programme of Norway with Romania and Bulgaria)
F	
FID	Free induction decay
FLD	Ferro Liquid Display or Ferro-electric Liquid Display (FLD) or Ferro Fluid Display (FFD) is based on Ferro electric properties of certain liquids.
FP7	EU Framework Programme 7
FPD	Flame-photometric detector, a type of chromatography detector
FS	feasibility study
FTIR	Fourier transform infrared spectroscopy (FTIR) is a technique which is used to obtain an infrared spectrum of absorption, emission, photoconductivity or Raman scattering of a solid, liquid or gas.
G	
GC-MS	Gas Chromatography Mass Spectrometry
H	
HACCP	Hazard analysis and critical control points

HRD	Human Resources Development
I	
ICP MS	Inductively coupled plasma mass spectroscopy
ICP-EOS	inductively coupled plasma optical emission spectrometry (ICP-OES), is an analytical technique used for the detection of trace metals.
IDT	Technological Development Engineer
IR	InfraRed
ISI	Inter-Services Intelligence
ISO	International Organization for Standardization
IT	Information technology
M	
MECMA	
METBE	Ministry of Economy, Trade and Business Environment
MFP	Ministry of Public Finance
MMFPS	Ministry of Labour, Family and Social Protection
MMS	Micro monitoring station
MS	Mass Spectrometry
MSc	Master of Science
N	
NH_3	Ammonia is a compound of nitrogen and hydrogen with the formula NH3
NO_x	is a generic term for the mono-nitrogen oxides NO and NO2 (nitric oxide and nitrogen dioxide)
NPD	Nitrogen Phosphorus Detector, a detector used in chromatography
O	
OECD	The Organization for Economic Cooperation and Development
OH&S	Occupational Health & Safety
P	
PAH	Polycyclic aromatic hydrocarbon
PHARE	Programme of Community Aid to the countries of Central and Eastern Europe
PhD	Doctor of science
PM	Particulate matter, particulates — fine dust and soot — suspended in the air PM10, particulates, smaller than 10 µm, that can cause health problems
PNCDI II	National Research, Development and Innovation Programme II
POS DRU	Sectoral Operational Programme Human Resources Development
POSCCE	Operational Sectoral Programmme – Increase of Economic Competitiveness
Q	
QA	Quality assurance, the process or set of processes used to measure and assure the quality of a product

QC	Quality control, the process of meeting products and services to consumer expectations
R	
R&D	Research and Development
RDI	Research-Development-Innovation
S	
SEA	strategic environmental assessment
SME	Small and medium-sized enterprises
SO_2	Sulfur dioxide
SOP HRD	Sectoral Operational Programme Human Resources Development
SOP ICE	Operational Sectoral Programmme – Increase of Economic Competitiveness
SOP IEC	Operational Sectoral Programmme – Increase of Economic Competitiveness
SRI	Relative score of influence
SWOT	SWOT analysis (alternately SLOT analysis) is a strategic planning method used to evaluate the Strengths, Weaknesses/Limitations, Opportunities, and Threats involved in a project or in a business venture
T	
T	Technicians (various grades - T, TI, TII, TIII)
TACIS	Technical Assistance for New Independent States
Th	Technicians (various grades - T, TI, TII, TIII)
TOC	Analyzer for solid and liquid samples
TSP	High Volume TSP Total Suspended Particulate Sample
U	
UEL	University Education Level
UV	Ultraviolet
V	
VAT	value added tax
W	
WFD	The Water Framework Directive (more formally the Directive 2000/60/EC of the European Parliament and of the Council of 23 October 2000 establishing a framework for Community action in the field of water policy)