National Research and Development Institute for Industrial Ecology - ECOIND

Activity domain:

Research / development in the field of environmental protection, related with economic activities, mainly industrial pollution

- **Vision**: Recognized national leader with international visibility, in the field of research and environmental services, technical-scientific organization competitive and financial solid, having high competent and well motivated personnel.
- **Mission**: Maintaining and consolidation of institute's position and role as representative institution in national environmental research system, with well known performance and results, which allows it to integrate within European research area. Environmental research of the institute will be aimed to respond to:
  - national and international tendencies in the field
  - the needs of economic units aiming to knowledge based sustainable development
  - Increase of technical and scientific production as new added value at knowledge on environmental protection
- **Certification**: INCD-ECOIND implemented and certified an Integrated Quality (ISO 9001:2008) and Environmental (ISO 14001:2004) Management System

  The testing Laboratories, within the Pollution Control Department are: RENAR accredited according to standard SR EN ISO 17025:2005, and SR CEN/TS 15675:2009 for measuring of pollutants emission and also, attested by the Ministry of Health, Department of Public Health and Control into Public Health for sampling and control monitoring activities for drinking water.

  The institute is registered in order to elaborate environmental documentation (impact studies, environmental balances, documentations for obtaining integrated authorizations, environmental risk assessment studies, elaboration of technical documentations for obtaining permits and licenses for water management) by the Ministry of Environment.

RESEARCH DIRECTIONS

Environmental Pollution Control: *Water, Air, Soil, Waste, Sludge, Sediments* (development of new analytical methods; eco-toxicological control of the contaminated environmental samples and evaluation of the ecological risk of chemicals on the aquatic organisms; microbiological studies to establish the pollution level of environmental media; impact of pollutants emission from permanent and mobile sources to air quality; pollution level assessment through mathematical modeling of the dispersion for chemical pollutants and noise; greenhouse gases emissions assessment; indoor air pollution)

Environmental Pollution Assessment *in correlation with legal requirements* (pollution status of environmental media ; impact assessment and environmental risk assessment Studies; hydro-biological studies to monitor the ecological status of Romanian water bodies and diversity of aquatic ecosystems; development of waste management studies and modern methodologies for hazard assessment of various wastes)

Pollution Prevention, Reduction and Abatement through Development of Environmental Technologies

Advanced & Applicative Researches to develop innovative & sustainable technologies/ biotechnologies for advanced removal of nutrients, priority substances from water/wastewater; Promotion of alternative technologies for revamping WWTPs and technical solutions for conditioning /processing sludge produced at WWTPs and other wastes, with recovery of valuable products; Development and promotion of technologies and criteria for alternative wastewater treatment, as passive, chemically and energetically self–sustained systems, applicable in the mining sector; Feasibility studies and technical projects for water supply works. Eco-technologies based on physical-chemical and biological processes for contaminated soils remediation; Eco-efficiency and industrial symbiosis principles applied in corporative development approach of industrial operators

Design/implementation/evaluation of quality, environmental, labor health and food safety management systems

Consultancy and technical assistance for developing, implementing, maintaining and improving, individual or integrated, management systems. Training courses, procedures and instruments for training and assessing of professional competences. Development of management standards /guidelines in the quality and environment field and occupational standards in the environmental protection field.

INCD ECOIND has developed within the SOP HRD—PROCOMPETENT project an Evaluation Centre of Professional Competences in environmental protection functional starting 2012, where 15 professional trained evaluators will carry-out the activity.

Important R&D Projects

INCD ECOIND coordinated or participated in consortiums within:

National programmes: National Plan of Research Development and Innovation (MENER, RELANSIN, BIOTECH, INFRAS, AMTRANS, CALIST, CERES), Research of Excellence Programme (CEEX), 2nd National Research Plan (PN II), CORE Program, Sectoral Program of the Ministry of Economy

International Programmes: USAID/GEF, PHARE, COST, UNIDO, ISPA, Leonardo da Vinci, EUREKA, FP7, LIFE, EEA, Cooperation programme with Norway, Transboundary cooperation programmes (RO-HU, RO-BG), Environmental programmes of Balkan Environmental Associations (B.EN.A.)

Bilateral projects with research institutes, universities, consultancy companies from France, The Netherlands, USA, Republic of Moldavia, Germany, Ukraine, Norway, Italy, Greece, Canada, Czech Republic, United Kingdom, Switzerland, Belgium etc. – in the field of pollution control, pollution assessment, environmental technologies, quality and environmental management systems

Development of INCD ECOIND research infrastructure in order to extend and diversify research works in the field of industrial ecology -INFRAECO-

Instrumente Structurale 2007 - 2013

Sectoral Operational Programme Increase of Economic Competitiveness
Priority Axis 2: Research, technological development and innovation for competitiveness
Operation 2.2.1: Development of existing RDI infrastructure and creation of new infrastructures (laboratories, research centers)
Duration: March 1, 2009 – February 29, 2012
Financing: European Regional Development Fund + National Budget

- **General objective**: *expanding the scope, diversification and opening new research directions in industrial ecology, by developing a new infrastructure for INCD-ECOIND, by providing the research departments / laboratories with modern and high performance equipment / installations / apparatus.*
- **Specific objectives:**

— New research infrastructure and setting up 13 new laboratories
— Development of new research directions (15) on consecrated institute's domains
— Enhancing the research capacity, consolidation of institute's position, development of national and international partnerships
— Development of cooperation with technological networks, stimulation of innovation through transfer of research results to economic environment
— Diversification of personnel's qualifications, career development, recruitment of young researchers (13 new jobs)
— Institutional development, increase of management effectiveness

Application of regional ecosystems principles to regional development - ECOREG

LIFE + Programme (2009 – 2011)

Consortium: Ministry of Environment and Climatic Changes, INCD ECOIND, GEC Bucovina, International Synergies Ltd. (UK)

Objective: Assessing and evaluating the potential of industrial symbiosis in a pilot area of Romania – Suceava county

Results:

- 239 companies and social units involved in the industrial symbiosis network
- Completed synergies led to +530.000 tons of reused waste:
    - 30000 tons demolition and construction waste
    - 500000 tons wooden waste
    - 2890 tons animal and food waste
    - 250 tons plastic waste
    - 20 tons electrical and electronic equipment
- An area of 3100 ha virgin forests has been spared, by replacing fire wood with briquettes from wooden waste
- Reduction of industrial water consumption with about 60000 m^3
- Creation of 28 new jobs
- Reduction of GHG emissions with more than 139000 tons CO_2 per year, as a consequence of replacing virgin resources with alternatives

Advanced degradation of xenobiotic compounds from water through appliance of advanced oxidation processes

Projects within national research – development – innovation programmes: CEEX, PNCDI II, Nucleu (2005-2012)

Consortium: INCD ECOIND, ICF Ilie Murgulescu of Romanian Academy, University of Bucharest – CCCFTA, University Politehnica Bucharest, SC SECOM SA

Objective: Advanced degradation technologies through homogenous – heterogeneous catalytic photo-oxidation processes of xenobiotic compounds (mono-, di-, tri- chlorbenzene, 4 chloroaniline, lindane, monolinuron)

Results:

- Design and development of solar photo-catalytic installation, with recirculation,
-Setting up kinetics and mechanisms for pollutants advanced degradation, in various systems and operating conditions,
- Assessment of operating conditions influence (photo-catalyst concentration, pollutant concentration, irradiance, irradiation time) upon degradation rates and efficiencies in various oxidation systems,
- Development of environmentally friendly technologies (using solar energy), modern treatment processes, not yet approached in Romania, designed to remove xenobiotics from water, down to concentrations below very stringent limits enforced by Romanian and EU environmental regulations (<1 µg/L)

Sustainable soil upgrading by developing cost effective, biogeochemical remediation approaches- UPSOIL

Framework Program 7 (2009 – 2012)

Consortium: LABEIN – TECHNALIA – Spain, VITO-MPT – Belgium, DELTARES – TNO – The Netherlands, WUR – the Netherlands, IETU – Poland, INCD ECOIND – Romania, SGI – Sweden, ENACON – Czech Republic, ECOREM – BALTIC – Lithuania, DEKONTA – Czech Republic, POWIZ – Poland, EJSLKOT – Denmark, RDS – Spain, BIUTEC – Austria, GEOCISA - Spain

Objective: Approaching innovative, in – situ treatment processes for rehabilitation of soil contaminated with petroleum products and chlorinated aliphatic hydrocarbons, with consideration of soil bio-chemical reactivity and also the contaminants properties and reactivity

Results:

- Promotion of new in-situ oxidation techniques based on encapsulated oxidants
- Smart coupling of chemical and biological processes for soil rehabilitation
- Cost efficient techniques for soil rehabilitation
- Better access to soil rehabilitation techniques of SMEs

Sustainable management in assessment and managing of organic sludge from urban wastewater treatment plants – post treatment of stabilized anaerobic sludge- NPTT

National Program PN II Partnerships in priority domains (2007 – 2010)

Consortium: INCD ECOIND, SC APA CANAL 2000 SA, SC CUP SA, SCDA Pitesti, USAMVB Timisoara

Objective: Development of biotechnological solutions for post-treatment of anaerobic digested residual organic sludge from urban wastewater treatment plants in order to ensure the conformation with legislative rules concerning their use as agricultural fertilizers

Results:

- Development of a composting technology with short treatment time which leads to a product with good fertilizing potential
- Transformation of the difficult to be stored urban wastewater treatment plant's waste into a valuable product, marketable, which can contribute to water – sewerage operator profit share
- Recovery and capitalization of other waste types (vegetal waste)
- Final product - compost as agricultural fertilizer
- Demonstration of the fertilizing capacity of the compost in vegetation vessels and in field crops

Monitoring system of the quality if water intended for human consumption, produced and distributed by Romanian companies

EEA Financial Mechanism (2009 – 2011)

Consortium: INCD ECOIND – Romania, STIFTELSEN SINTEF Norway

Romanian Water Companies involved in project: SC ECOAQUA SA Calarasi and SC CUP "Dunarea" SA Braila

Objective: to protect the population health from adverse effects of any contaminated water intended for human consumption by ensuring that potable water produced and supplied by Romanian Companies fulfills the quality requirements imposed by national and European regulations (EU Directive 98/83/EC)

Results:

- Complex and representative monitoring program of the quality of water produced and supplied by 2 regional companies, from the source of raw water, on the treatment flow and in the distribution network, to consumers (network extremities included)
- Overall assessment and statistical interpretation of the results obtained after implementation of the optimized monitoring program to identify possible causes leading to degradation of water quality identification
- Recommendations/ solutions for: Improvement of the existent Analytical Control Schemes, Optimization /Modernization of the Actual Potabilization Flow to assure drinking water quality improvement and to protect human health from the adverse effects of any contamination of drinking water,;Maintenance and Control of Distribution Network
- Knowledge and Innovation transferred to other Romanian DWTP and water supply systems

Impact assessment of pollution with PM 2.5 breathable particulate matter from urban areas with intense road traffic on the population health

National Program PN II Partnerships in priority domains (2007 – 2010)

Consortium: National Institute of Public Health Bucharest, INCD ECOIND, University Politehnica Bucharest, Bucharest Police Authority

Objectives:

- Correlation between air polluted with PM 2.5 and population health;
- Information of central and local authorities responsible about the pollution level and the necessity of introducing legal restrictions for this pollutants.
- Long term monitoring for the level of pollution with PM 2.5 in urban areas with intense road traffic; Concentration of heavy metals and PAH's absorbed on particulate matter determination;
- Long term health surveillance for the population exposed to this type of pollution, using specific health tests;
- The corelation of the results regarding the level of pollution with PM 2,5 and other dangerous substances absorbed by particulate matter with the results of the health tests.

Results:

- Road traffic is a very important source of air pollution with particulate matter, heavy metals and polycyclic aromatic hydrocarbons;
- PM10 contain 70% PM2.5, and represents 40% from TSP; PM 2,5 represents 30% from TSP;
- 90% from the quantity of aromatic polycyclic hydrocarbons was founded in PM 2.5 particles;
- The health of the population from urban areas with intense road traffic is strongly affected by exposure to this type of pollution