Italian National Agency for new technologies, energy and sustainable economic development

ENEA activities on Environmental Technologies

Roberto Morabito
Environmental Technologies Technical Unit
UTTAMB

ENEA - Italian National Agency for New Technologies, Energy and Sustainable Economic Development

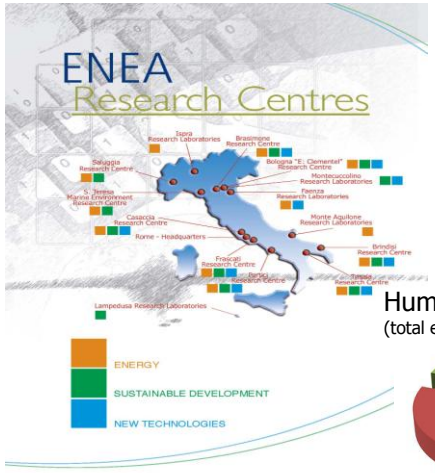
- It was established with the Law no. 99 of July 23rd 2009, art 37, and is based on the expertise, staff and facilities of the former ENEA – Italian National Agency for New Technologies, Energy and the Environment
- The present day ENEA's expertise is the result of more than 50 years of research and innovation carried in the fields of energy, new technologies and the environment.

ENEA - Italian National Agency for New Technologies, Energy and Sustainable Economic Development

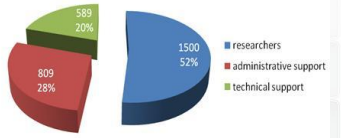
- Its mission is to support Italy's competitiveness and sustainable development through research and innovation technology activities and agency services in support to public administrations, private enterprises, with particular regard to SMEs, and citizens.

- ENEA is organized into 23 Technical Units providing research, technology innovation and advanced services, with a permanent staff of 2.800 among researchers, technicians and administrative staff, operating in 13 Research Centres all over Italy

ENEA IN FIGURES



Human Resources
(total employed 2863 updated at 30.06.2010)



R&D Main topics

ENERGY
Nuclear Fusion
Nuclear Fission
Renewable Energy Sources
Energy Efficiency
Advanced Technologies for Energy and Industry
NEW TECHNOLOGIES
Radiation Applications
Material Technologies
Energy and Environment Modeling
ICT
SUSTAINABLE ECONOMIC DEVELOPMENT
Environment Characterization, Prevention and Recovery
Environmental Technologies
Seismic Protection
Radiation Biology and Human Health
Sustainable Development and Innovation of the Agro-Industrial System

ENEA at a glance

- Annual volume of Projects: Euro 46.825.000 (2009)
- More than 120 ongoing projects financed by EC, 80 of which financed by 7th FP till July, 2010 (main themes: EURATOM fission, Energy, Environment and Research Infrastructures)
- 1200 partners from 66 countries all over the world

ENEA' activities

ENEA activities on

Environmental Technologies

The Frame

- 2000 Lisbon – ….Information Society……knowledge-based economy…….strategy
- 2001 Gotheborg – The sustainable development strategy – Needs for integrated policies allowing the achievements of economic, social and environmental goals (decoupling development and environmental degradation)
- 2003 Brussels – Environmental Technologies are acknowledged as one of the main pillars for achieving the Gotheborg strategy
- January 2004 – The European parliament approves the Environmental Technologies Action Plan (ETAP)

The Frame

- Environmental Technologies are those cleaner and resource efficient technologies which can decrease material inputs, reduce energy consumption and emissions, recover valuable by-products, minimize waste disposal problems or some combination of these.

- Environmental Technologies are not only single technologies but also total systems including know-how, procedures, methodologies, management plans, etc

Environmental Technologies Technical Unit

- UTTAMB – Casaccia RC – 5 labs (and 1 administrative unit):
  - Integrated Waste Cycle
  - Ecoinnovation of productive systems
  - Development of future scenarios and modelling for the evaluation of atmospheric pollution
  - Environmental restoration
  - Environmental management systems

Our main "clients"

At national level:

- ✓ Public Authorities (Ministries of the Economic development, the Environment, the Research, Regions, Municipalities, etc.)
  - *Scientific and technical support, advisor and services*
  - *Cooperation in joint projects of R&D*
- ✓ Industrial sector, particularly SMEs
  - *Cooperation in joint projects of R&D*
  - *Technology transfer*
  - *Demonstration*
  - *Identification and replication of Best Practices*
  - *Dissemination*

At international level:

- ✓ European Commission (DG Environment, DG Research, DG Energy, DG Enterprise)
- ✓ UNIDO
- ✓ Public Authorities of Foreigner Countries

The activities

- ➢ All the activities carried out by ENEA-UTTAMB aim to sustainability of urban, touristic and industrial systems integrating:
  - ❖"Traditional" R&D activities
  - ❖"New" Agency functions
    - Supporting the EC and Italian Government in policies and related legislation, regulation, etc
    - Supporting national, regional and local Institutions in the implementations of EC Directives and regulations, of environmental management plans at local, regional and national levels
    - Supporting industries, mainly SMEs, in the implementation of environmental technologies developed by ENEA or market available

Main sectors

- Waste cycle management
  Casaccia and Trisaia Research Centres
- Eco-innovation of productive processes and systems
  Casaccia Research Centre
- Water management
  Bologna, Casaccia and Trisaia Research Centres
- Environmental restoration
  Casaccia Research Centre
- Environmental certification and management tools and eco-design
  Bologna and Casaccia Research Centres
- Air quality
  Bologna and Casaccia Research Centres

The sustainable management of waste

Development of technical and scientific competencies on the waste management in the framework of the environmental sustainability.

Monitoring and analytical characterization of waste and emissions from treatment activities

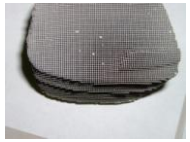
The sustainable management of waste, together with the prevention actions, softens the environmental impacts related to the transformation and the depletion of raw materials, and reduces quantity and hazard of products that should be inevitably disposed as waste at the end of their life cycle.

Experimentation, demonstration, validation and monitoring of technologies and systems

Promotion e strengthening of innovative technologies for the recovery of waste as a tool to reduce the exploitation of natural resources and the impact of the management systems, by means of:

- promotion of industrial initiatives in local frameworks;
- technical-economical validation of the synergies between different waste streams treatments;
- the growth of programmatic arrangements between local institutions and entrepreneurs.

Metal recovery from wastes



PGMs (platinum, rodium, palladium) recovery from automotive spent catalysts

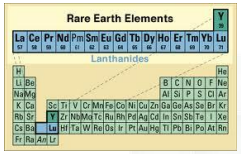
Lead, plastic, micronized silica and energy recovery from spent lead-acid batteries

Nickel, Cadmium, Zinc, Manganese recovery from spent batteries used in the electronic devices

Waste as a resource and not as a problem

Metal recovery from waste electrical and electronic equipment (WEEE)

Recovery of metals (e.g.Titanium, Vanadium, Cobalt and Manganese) from fly ashes and industrial exhaust catalysts



Rare Earths recovery from spent catalysts, super-alloy scrap, spent batteries, sludge, dusts

Eco-innovation

Research & Development

- Eco-innovation of single processes (BATs, BREF, etc..)
- Eco-innovation of products (Ecodesign, LCA, etc..)
- Eco-innovation of industrial/productive areas (integrated system management, industrial ecology, etc..)

Eco-innovation through innovative technologies and methodologies

Technical advise, training, dissemination

- Supporting private and public stakeholders in eco-innovation and related policy implementation (REACH, RAEE, WFD, ..)

Ecoinnovation in the textile industries

- BATTLE Project - Best Available Technique for water reuse in TextiLE
  - Development and prototypal application of a clean technology for the water reuse, at present not envisaged in the BREFs, to be proposed as reference BAT for SMEs as well for large enterprises.
- INTEXUSA project - INTelligent innovation for sustainable TEXtile production: Optimisation of dyeing processes with UltraSonic technology and its integration with Automatic on-line control.
  - Advantages of UltraSonic technology in dyeing processes:
    - Increased dyes diffusion towards fibers
    - Increased dyes dispersion (aggregates decomposition)
    - Air expulsion/degassing from fibers
    - Strong liquid agitation

The EU project BATTLE

Water Reuse Plant performances in March

Total recovered water (m^3)	Daily average recovered water (m^3/d)	Daily average rec. water in days of regular functioning (m^3/d)	Hourly Average treated Water (m^3/h)	Total printed fabric (l.m.)	UF Recovery Factor
7691	373	503	42	1.310.764	0,7

INTEXUSA Project

- Excellent qualitative results obtained with natural fibers (wool, cotton)
- Energy saving due to lower process time and temperature than in classical dyeing processes
  - Time 50 minutes less
  - Temperature: 60°C instead of 80 °C

Ongoing studies

- Reduced emission of organic substances (dyes, dispersants, wetting agents) thus reducing wastewater treatment costs
- Reduced water consumption

Cotton cloth - Dye "blue Kemazol 2%"

Wool cloth -Dye "Red Nylosan E-BL, 1%"

Consultancy to UNIDO

(United Nations Industrial Development Organization)

- Promoting the implementation of BAT/BEP to reduce unintentional releases of persistent organic pollutants (POPs) from industry sources
  - mainly pertaining to the metallurgical sector (ferrous and non-ferrous) in developing countries and economies in transition.
- Provision of a range of services in different stages of investment projects
  - dissemination of industry-related knowledge
  - provision of technical assistance for the individuation of suitable industry strategies to accelerate sustainable industrial development.

On-going R&D activities

- R&D projects at international (different EC funding programmes such as FP7, LIFE+, ENPI, PON, etc. - UNIDO) and national (Ministries, SMEs) level

- Large integrated projects integrating two or more of the listed fields according to the principles of the Industrial Ecology approach