

Portrait of the Joint Research Centre

What we can do *with* and *for* you



**Robust science
for policy making**



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Preface

Progress in society is intimately linked to scientific and technological advancement. However, all new developments bring complex challenges for political decision-makers: opportunities need to be balanced with risks, concerning in particular their safety, socio-economic impact and ethical considerations. Also, different sectorial impacts need to be considered. This requires increasingly watchful, alert, responsible and forward-looking scientific support. It is also clear that most issues are not specific to one country and may require pooling existing knowledge in order to develop global responses, as in the case of climate change or infectious diseases. Also, the risk of pressure coming from various interest groups illustrates the need for independent and unbiased scientific advice to policy makers.

Ten years ago, the Joint Research Centre changed its mission to provide support to the European policy-making process, as the scientific and technical arm of the European Commission. Over these years, the demand for scientific and technical support from the EU policy-makers has risen sharply.

From this perspective we started an internal exercise to better profile the JRC for its prospective customers and to position it vis-à-vis other research institutions, both inside and outside Europe. The content of this brochure is the result of a reflection process carried out by the seven JRC institutes to identify those areas where the JRC has the greatest added value over what exists in the Member States and where the focus of the European policy needs will be in the future.

The brochure presents the profiles of the seven JRC institutes within their areas of specialization. It is intended to be a tool for our customers and stakeholders to better understand the services that the JRC can provide and whom to address with queries. It is also a tool for sharpening the profile of the JRC and of its institutes.

We sincerely hope that our effort will bring fruits and contribute to improvement of governance and quality of life of our European society.

Dr Roland Schenkel, Director General



Joint Research Centre

Extended Mission Statement of the JRC

1. Mission Statement

The mission of the Joint Research Centre (JRC) is to provide customer-driven scientific and technical support for the conception, development, implementation and monitoring of European Union policies. As a service of the European Commission, the JRC functions as a reference centre of science and technology for the Union. Close to the policy-making process, it serves the common interest of the Member States, while being independent of special interests, whether private or national.

The goal of the JRC is to:

- deliver robust and fit-for-purpose scientific-technical support to policy makers based on a strong anticipatory function, strategic dialogue with customers and stakeholders and an appropriate research base;
- foster excellence through internal quality control and external peer review, evaluation and benchmarking; strive for quality labels and certifications wherever appropriate;
- work with key players worldwide on global issues such as environment (climate change, fuel and vehicle emission standards), trade (risk assessment of chemicals, reference materials, validation of alternative methods), energy (nuclear safety and sustainability, hydrogen economy), citizen safety and security, humanitarian and environmental crises;
- maintain a healthy balance between research, research-based support and operational support; strive for an appropriate level of competitive income;
- establish or maintain an acknowledged reference role in key areas of competence, where appropriate in cooperation with relevant institutions in the Member States.

2. Policy Support Areas

The main customers of the JRC are the policy-making Directorates General of the European Commission. Depending on the subject matter, the JRC's scientific-technical support covers the complete policy cycle or parts of it: the JRC anticipates policy needs, assesses policy options and their impacts, and monitors and contributes to the implementation of policies. It also provides operational support in certain cases, for example

in anticipating environmental disasters, providing assistance to managing crises and assessing any consequential damage and their impact on human life and/or the environment. In providing scientific-technical support to the Directorates General of the European Commission the ultimate beneficiaries are the EU Member States.



The JRC provides scientific-technical support also to the other

EU institutions involved in policy-making: it carries out studies for the European Parliament at its request and provides information and assessments in the frame of the EU crisis response mechanisms which involve the Council.

The JRC cooperates with relevant EU agencies, for example through exchanging data and information and development of informatics tools.

The JRC provides support to authorities in the Member States in areas where it has a special competence or is mandated to do so by EU policies. In the frame of the EU's enlargement, the JRC assists the states in question with the take-up of the body of EU law ("acquis").

While the bulk of the JRC's work is financed through institutional funding, the JRC earns up to 15% of its total income through competitive work.

The JRC provides scientific-technical support mainly to the following policy areas of the Commission:

- Chemicals legislation,
- European Research Area (ERA),
- Internal market: financial services, system of common standards,
- Energy policies (clean and sustainable energy production and conversion; safe and secure energy supply: energy efficiency, renewable energies, nuclear energy),

- Sustainable transport,
- Information Society: competitiveness, innovation and inclusion,
- Common Agricultural Policy: rural development, sustainable agriculture,
- Maritime Strategy: fisheries, marine policy, security,
- Environmental policies (support to various legislative acts such as on fuels, soils, water, forests, air quality, Infrastructure for Spatial Information in Europe (INSPIRE)),
- Climate change: Kyoto protocol and post-Kyoto policy options,
- Health and consumer protection: food and feed safety and quality, cosmetics directives,
- Internal and Global Security,
- Nuclear Policies.

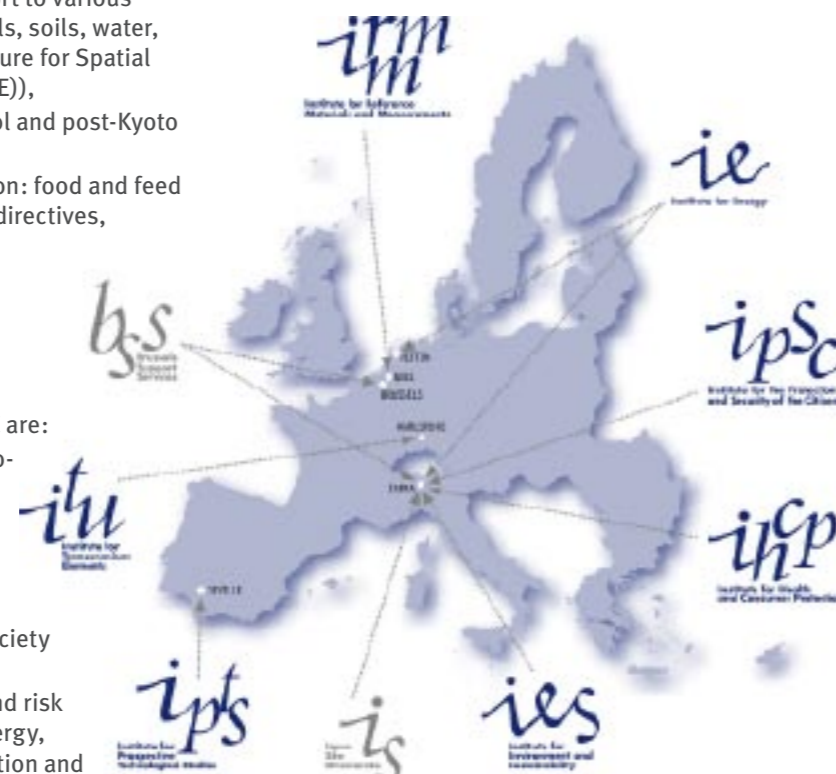
3. Core competences

The core competences of the JRC are:

- scientific/technical and techno-economic studies, modelling and assessments in support of the Common Agricultural Policy, environmental, energy and transport policies, biotechnology, information society and the Lisbon Agenda;
- safety, performance testing and risk assessments in support of energy, environment, chemical legislation and security policies;
- development of reference materials, validation and harmonisation of measurement methods in support of the internal market, environmental protection, food safety, consumer protection and nuclear safety;
- technical, statistical and web-based intelligence methods in support of anti-fraud measures under various policies, internal and external security and civilian crisis management;
- spatial analysis techniques for environment and security monitoring (GMES);
- nuclear waste management, nuclear safety and security;
- analytical methods, basic and applied research supporting the above horizontal competences.

4. Main scientific-technical reference functions of the JRC

In keeping with its mission, the JRC strives to play a role as a centre of reference in its key competence areas through extensive networks with the relevant organisations in the Member States and, where appropriate, international organisations.



The main JRC reference functions are:

- Development of reference materials, development and harmonisation of measurements in support of a harmonised system of measurements in the EU and/or sector-specific legislative acts;
- Validation of data and measurements, particularly in the area of environment and health and consumer protection policies; JRC currently runs six Community Reference Laboratories (and their networks) in support of the implementation of various food safety control and health directives. In addition, the “European Centre for the Validation of Alternative Methods” validates alternative methods to animal experiments in the framework of the cosmetics directive; this validation is mandatory for such alternative methods to replace experiments on animals.

- Certification of certain types of equipment (solar cells, digital tachograph etc.).
- Establishment of interoperable services in the frame of the directive on “Infrastructure for Spatial Information in the European Community” (INSPIRE) based on harmonised data sets.
- Establishment of norms for directives and/or pre-normative research is supported by a number of experimental facilities, such as the Vehicle Emissions Laboratory (VELA), the European Laboratory for Structural Assessment (ELSA) and test facilities for hydrogen storage and fuel cells.
- Providing reference data through the so-called “bureaus” (e.g. the European Bureau for Wine, Alcohol and Spirit Drinks which supports anti-fraud in the European wines and spirits trade), promoting establishment of harmonised data sets (e.g. the European Soils Bureau) or best practices with reference function (e.g. the European Bureau for Integrated Pollution Prevention and Control, the European Clearing House on Nuclear Power Plant Operational Experience Feedback, the European Coexistence Bureau for technical measures at farm level to ensure coexistence between conventional, organic and GMO-bearing crops).
- Verification of compliance with the EURATOM and International Treaties through nuclear reference laboratories and accredited safeguards measurements in support of DG Energy and Transport and the International Atomic Energy Agency (IAEA) in Vienna.
- Operation of two on-site laboratories for nuclear safeguards in EU fuel reprocessing installations.
- Operating key and sometimes unique experimental infrastructures, underpinning the scientific-technical reference function, varying from nuclear research to production of certified reference material.
- Hosting a large number of unique pan-European and global environmental information systems and data centres (e.g., the Global Land Cover 2000 database).

The Member States are in many cases direct beneficiaries of the above activities.

5. Governance

The customers of the JRC are involved as stakeholders in the governance of the Centre. The Directorates General of the European Commission comment on the content of the JRC’s part of the

Framework Programmes for Research and on its multi-annual and annual work programmes. There is a dedicated interface group with the European Parliament in which current JRC activities of interest to the EP are discussed. The European Parliament and Council co-decide on the JRC’s part of the Framework Programmes for Research and its specific programmes¹ and on the relevant budgets. Member States can give their opinion and advice on strategic matters of the JRC through the JRC’s Board of Governors to which they nominate high-level representatives.

¹ THE COUNCIL ALONE IS COMPETENT FOR THE EURATOM PART

6. Structure of the JRC

INSTITUTE FOR....	TYPE OF ACTIVITY, RESEARCH FOCUS.	COUNTRY
REFERENCE MATERIALS AND MEASUREMENTS (IRMM)	A common measurement system in support of EU policies, notably for environment, trade, health and consumer protection. Nuclear measurements.	BELGIUM
TRANSURANIUM ELEMENTS (ITU)	Effective safety of the conventional and advanced nuclear fuel cycles. Nuclear safeguards and security. Fundamental research into physics and chemistry of relevant radioactive elements.	GERMANY
ENERGY (IE)	Support to energy policies for secure sustainable and efficient energy production distribution and use. Present and future nuclear reactors safety.	THE NETHERLANDS AND ITALY
PROTECTION & SECURITY OF THE CITIZEN (IPSC)	Information technologies, system engineering, risk analysis, non-proliferation and nuclear safeguards. The main research focus of the institute is in data mining, spatial analysis and modelling of complex systems.	ITALY
ENVIRONMENT AND SUSTAINABILITY (IES)	Supports policies for the protection and sustainable development of the European and global environment. Key fields of activity include climate change, natural hazards, transport and air quality, renewable energies, sustainable use of natural resources, ecosystem modelling monitoring and the environmental dimension of development co-operation.	ITALY
HEALTH & CONSUMER PROTECTION (IHCP)	Support to the chemicals legislation; analysis and quantification of GMOs in food and feed in support of health and consumer protection policies; validation of alternative methods in support of chemicals and cosmetics legislations; risk analysis of release of chemicals from consumer products, and of nanomaterials.	ITALY
PROSPECTIVE TECHNOLOGICAL STUDIES (IPTS)	Foresight and techno-economic analyses supporting European policy-making	SPAIN

The JRC Institutes

1. Institute for Reference Materials and Measurements (IRMM)

1.1 Mission

The mission of the JRC-IRMM is to promote a common and reliable European measurement system in support of EU policies.

1.2 Policy support areas

In the context of EU policies for consolidating the Single Market and reinforcing the competitiveness of EU companies, the primary focus of the Institute is on generic measurement science applied to a broad range of areas and policy themes, covering both nuclear and non-nuclear fields. This is used to reinforce the confidence of EU Member States and stakeholders (policy makers, citizens, industry, trade, other commercial operators...) that the system deployed by EU bodies to control the implementation of directives and regulations is sound. Reliability and comparability of measurement and test data also contribute to the competitiveness of European enterprises and diminishes barriers to trade by building trust and reducing the need to duplicate or dispute measurements.

The quality assurance tools produced by IRMM not only serve the policy areas of food safety and quality, control of environmental pollution, health, standardisation, international trade, customs, nuclear safety, nuclear waste management or nuclear safeguards, but also find their applications in scientific fields such as biotechnology and nanotechnology.

In addition, the institute acts as an independent and internationally recognised centre of competence and reference to which cases of litigation can be addressed and where controversies regarding measurements can be solved.

1.3 Core competences

- Analytical chemistry and bio-analysis,
- Biochemistry and food chemistry,
- Nanomaterials and physico-chemistry of surfaces,
- Radionuclide metrology,
- Isotope measurements,
- Production of Reference materials,
- Production of nuclear data.

The institute continues to play its role of main European provider of reference data on neutrons

interactions with matter, as needed for nuclear safety, waste management and nuclear security.

In view of these internationally recognised competences, the institute aims at becoming the reference centre of the European Commission providing confidence in measurements.

1.4 Scientific and technical reference

The above competences provide the institute with the ability to produce and disseminate a range of internationally accepted quality assurance tools:

- Validated methods,
- Reference materials and measurements,
- Inter-laboratory comparisons.

The institute also operates four Community Reference Laboratories (CRL):

- The CRL on feed additives,
- The CRL on mycotoxins,
- The CRL on polyaromatic hydrocarbons (PAH),
- The CRL on heavy metals in feed and food.



Gamma-ray spectrometer for neutron non-elastic scattering reactions

1.5 Key experimental facilities

- State-of-the-art and comprehensive analytical facilities,
- Biotechnology laboratory,
- Reference material production and storage facilities,

- LINAC linear electron accelerator,
- Van de Graaf proton accelerator,

- HADES (High Activity Disposal Experimental Site) for low background radioactivity measurements.



European Reference Materials

1.6 Customers

The EU Member States are important customers. The main users of reference materials produced by the institute are the control laboratories for food safety, the laboratories for environmental monitoring and control, the reference laboratories for in vitro diagnostics and all laboratories worldwide which need to comply with the requirements of accreditation under ISO 17025. Its main customers in the European Commission are:

DG Agriculture (AGRI): authenticity of food, reference materials, isotope measurements,

DG Energy and Transport (TREN): nuclear reference materials, nuclear data for waste management and nuclear safeguards, radionuclide metrology, inter-laboratory comparisons,

DG Environment (ENV): validated methods and certified reference materials for the detection of environmental contaminants, inter-laboratory comparisons,

DG Enterprise (ENTR): reference materials and contributions to standardisation, representation of the European Commission in international bodies like CIPM, CCQM, JCTLM and EURAMET e.V.,

DG External Relations (RELEX) and EUROPAID: inter-laboratory comparisons, metrology, metrology tools for nuclear safeguards, support to the global measurement infrastructure,

DG Customs Tariff (TAXUD) and DG TRADE: food safety and quality control, reference materials and measurements,

DG Health and Consumer Protection (SANCO) and European Food Safety Authority (EFSA): Community Reference Laboratories; validation of analytical methods for detection of BSE/TSE, for allergens and for diverse food and feed additives and contaminants,

A number of international organisations are customers of the IRMM for nuclear reference materials, data and measurements, such as European Accreditation, the Consultative Committee on Amount of Substance (CCQM) of the CIPM, OECD-NEA, IAEA, and the nuclear industry at large.

2. The Institute for Transuranium Elements (ITU)

2.1 Mission

The mission of the ITU is to provide the scientific foundation for the protection of the European citizen against risks associated with the handling and storage of highly radioactive elements.

2.2 Policy support areas

Nuclear waste management: the institute addresses and follows the scientific and technical issues of the two main approaches for the management of spent nuclear fuel: direct final disposal and reprocessing (partitioning) for lowering the radiotoxicity (through the transmutation of long-lived actinides) before final disposal of the waste in geological formations.

Safety of nuclear fuel: the institute works on better understanding and modelling the behaviour of nuclear fuels under extreme use and accidental conditions. This knowledge is applied to define the response and precautions to be taken for the safe operation of nuclear energy and in case of accidents. This know-how addresses conventional types of fuels and is developed for new/advanced types of fuels expected to be used in some of the Generation IV reactor systems.

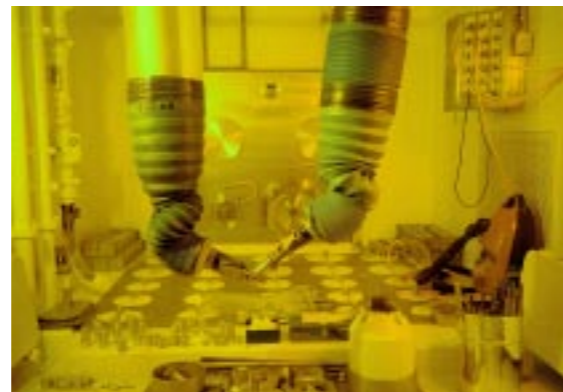
Safeguards and Nuclear Forensics: the institute develops methodologies and analytical techniques for the control of nuclear material, supporting the European and International Safeguards Authorities. It offers a high quality service based on its large number of accredited measurement methods. This includes also new fuel cycles. Concepts for response to illicit trafficking of nuclear material have been developed, enabling credible nuclear forensics analyses.

Knowledge management, education and training: the institute is playing its full role as reference centre in creating, assessing, promoting and disseminating comprehensive sources of reliable nuclear information, providing high-level training for young students, researchers and regulatory authorities in the nuclear field.

2.3 Core competences

- Nuclear Material Properties and Modelling,

- Nuclear Fuel Properties and Behaviours in Conventional and Advanced Nuclear Fuel Cycles and Processes,
- Radiometric and analytical measures and methods for safeguarding conventional and advanced fuel cycles,
- Nuclear Forensics,
- Basic Actinide Science and Applications,
- Investigation and Development of Radionuclide Medical Applications.



The Hot Cells facility at ITU

2.4 Scientific and technical reference

- Fundamental properties of actinides and associated products, reference databases and basic information (Karlsruhe Chart of Nuclides, Nucleonica nuclear science web portal),
- TRANSURANUS and related codes,
- Detection of undeclared nuclear activities by analysing U and Pu particles,
- Combating illicit trafficking including nuclear forensic analysis for the detection of seized samples,
- Development and study of Alpha-immunotherapy for cancer treatments and production of related radio-elements,
- Operation of analytical laboratories accredited by EURATOM and IAEA.

2.5 Key experimental facilities

- Infrastructure and facilities with availability and access to a variety of nuclear materials for experimental work,
- Hot cells and related instruments,
- Chain of glove boxes and related instruments,

- Minor Actinide Laboratory,
- Actinide User Laboratory,
- Clean laboratory category 10-100 for safeguards and nuclear forensic applications,
- Alpha-immunotherapy laboratory,
- Safeguards laboratories,
- POLARIS,
- Electron Microprobe Analysis,
- Physical property measurement systems at very low temperature (< 0.3 K) and highpressure (>20 GPa).

- DG Justice, Freedom and Security (JLS): Radiological Risk Reduction in the EU,
- DG Research (RTD): Technology Platforms and JTI, framing of nuclear safety research policy, Generation IV International Forum.



Nuclear Detectives investigating a package suspected of containing smuggled nuclear material

2.6 Customers

Important customers are:

- Member States: waste management, fuel safety, nuclear forensics,
- The International Atomic Energy Agency (IAEA): support to the IAEA in nuclear safeguards, combating illicit trafficking, nuclear forensics and related trainings,
- Europol and Interpol: illicit trafficking of nuclear or radioactive materials.

The main customers of the institute in the European Commission are:

- DG Energy and Transport (TREN): The Institute operates and maintains on-site laboratories in the reprocessing plants of La Hague and Sellafield; in-field technical support to the Inspectorates; analyses of nuclear samples and swipes,
- EuropeAid (AIDCO): Implementation of TACIS programme,

3. Institute for Energy (IE)

3.1 Mission

The mission of the IE is to provide support to Community policies related to both nuclear and non nuclear energy in order to ensure sustainable, secure and efficient energy production, distribution and use.

3.2 Policy support areas

Theme “Energy”:

- Renewable energies including solar, photovoltaics and biomass,
- Bioenergy including biofuels,
- Hydrogen and fuel cells,
- Clean fossil including CO₂ capture, transport and storage and zero-emission power generation,
- Energy efficiency in: buildings, industry, transport and end-use,
- Security of energy supply and networks and safety and reliability of energy infrastructures.

Theme “Nuclear Safety”:

- Sustainable and safe nuclear energy for current reactor types (generation II and III),
- Safety of future reactor systems in accordance with the Generation IV International Forum strategy.

3.3 Core competences

- Energy Technology and systems - Engineering and Assessment,
- Modelling (Physico-chemico-mechanical and techno-economic),
- Energy efficiency assessment,
- Materials science,
- Safety and security assessment of energy supply, networks, systems and infrastructures
- Nuclear Engineering,
- Nuclear safety of present and future reactors.

3.4 Scientific and technical reference

- Characterising the performance of fuel cell technologies for transport and stationary applications in terms of efficiency, reliability, durability and emissions,

- Testing the performance of systems for the storage and distribution of alternative fuels – hydrogen, natural gas,
- Testing of photovoltaic devices,
- Testing the integrity of materials used in nuclear power plant,
- European Clearing House on Nuclear Power Plant Operational Experience Feedback,
- European Energy Technologies Information System (EETIS) of the SET Plan.



Fuel cell undergoing testing for stationary applications

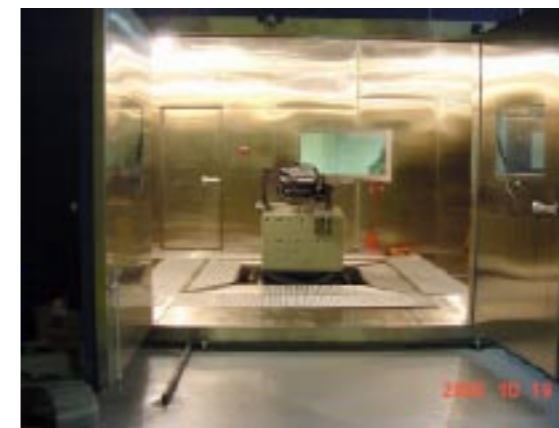
3.5 Key experimental facilities

- European Solar Test Installation (ESTI),
- High Flux Reactor (irradiation experiments, neutron beam applications),
- Fuel cell assessment and performance validation facility (for transport and stationary applications),
- Plant Simulation Test Laboratory for biomass/ waste combustion, gasification and hydrogen sensors ,
- High pressure gas (hydrogen, natural gas) storage tank testing facility (for transport and stationary applications),

- Structural integrity testing laboratories (mechanical, stress corrosion and non-destructive analyses) for safety of current and future nuclear reactor systems and for nuclear waste containments.

Experimental activities performed in these facilities are complemented by desktop assessment and modelling activities on the potential and impact of energy technologies.

The ultimate objective of this work, in collaboration with the other JRC institutes (primarily IES, IPSC and IPTS), is to provide the EC with a comprehensive in-house competence in energy technologies.



Environmental chamber for testing of fuel cells under real working conditions

3.6 Customers

The main customers of the Institute in the European Commission are:

- DG Energy and Transport (TREN): SET Plan implementation, renewable energies, end-use and transport energy efficiency, co-generation, security of energy supply, fossil energy technologies, energy infrastructures, hydrogen and fuel cells, energy modelling, safety of nuclear power plants (also in the frame of WPNS and WENRA), nuclear energy in the energy mix and waste management.
- DG Environment (ENV): Emissions reduction and climate change mitigation from energy generation, conversion and use; CO₂ storage; waste-to-energy; bio-energy for power and heat applications, renewable energies, environmental performance verification.

- DG Research (RTD): Technology Platforms and JTIs (in particular Fuel Cells and Hydrogen), Strategic Energy Technology Plan, IPHE, CSLF, framing of nuclear safety research policy, Generation IV International Forum.
- DG Enterprise and Industry (ENTR): Sustainable transport (Support to International Standardisation and regulation in the Hydrogen and Fuel Cells, Hybrids, UNECE GRPE (Working Party on Pollution and Energy), UNECE GRSP (Passive Safety).
- DG Agriculture (AGRI): Energy from biomass, Biogas.
- DG Justice, Freedom and Security (JLS): Energy security.
- DG Relex: International dimension to energy security, NESCO (Network of Energy Security Correspondents).
- DG Enlargement (ELARG), EuropeAid (AIDCO) and External Relations (RELEX): Reviewing, implementing and evaluating assistance programmes (TACIS, PHARE, INSC, IPA) for nuclear operations in the Commonwealth of Independent States, former PHARE countries, candidate countries, as well as worldwide in the frame of the Instrument for Nuclear Safety Cooperation (INSC).

EU Member States benefit from many activities of the institute. Direct involvement with international organisations such as the International Atomic Energy Agency (IAEA), WENRA, the OECD/NEA and the International Energy Agency (IEA) is well established.

4. Institute for the Protection and Security of the Citizen (IPSC)

4.1 Mission

The mission of the IPSC is to provide research results and to support EU policy-makers in their effort towards global security and towards protection of European citizens from accidents, deliberate attacks, fraud and illegal actions against EU policies.

4.2 Policy support areas

- Global Stability and Security: enhancing EU's crisis preparedness and response capacity in early warning, situation monitoring, and impact assessment; automated assessment and decision support tools in external security and crises situations; algorithms for automatic satellite image interpretation and analysis; data and web mining technologies.
- Enforcement of Common Fisheries Policy (CFP) regulations: remote sensing for vessel detection; Electronic Logbook development, traceability techniques for the fisheries supply chain.
- Maritime Policy: detection of pollution from ships by remote sensing, identification of illegal immigration patterns; container seals and traceability technologies, data mining for route based risk analysis of container shipments.
- Common Agricultural Policy (CAP): crop yield forecasts and statistics at European and Member State level for market analyses, geomatic techniques to reinforce the consistency of land parcel identification and measurement across the Union.
- Anti-Fraud: statistics and information analysis to detect fraud against the EU policies, including those on Enlargement, Agriculture, Customs, External Aid and the non-profit sector.
- Protection of Critical Infrastructures: development of criteria for the definition of European Critical Infrastructures. Risk analysis for physical vulnerability assessment of buildings, risk assessment of the electric power distribution grid and IT based networked infrastructures.
- Nuclear Safeguards: Measurement methods of nuclear and radioactive materials, qualification of Non Destructive Analysis equipment, on-site assistance and training for IAEA and Commission inspectors. Software tools and probabilistic methodologies for the evaluation of nuclear safeguards effectiveness, proliferation resistance, physical protection and vulnerability assessment. Analysis of import/exports of dual-use technologies and goods.
- Horizontal Activities: econometrics and anti-fraud. Statistics and information analysis, composite

indicators for the evaluation of the effectiveness of policies.



The European Laboratory for Structural Assessment (ELSA) is specialized in the vulnerability assessment of buildings and civil structures under natural hazards and intentional attacks.

4.3 Core competences

- Information Technologies: satellite image processing and analysis; web technologies, open source information acquisition and analysis; wireless communication equipment testing; complex systems modelling, statistics and econometrics.
- Engineering: structural mechanics; risk assessment, accident analysis, nuclear safeguards.

4.4 Scientific and technical reference

The institute performs a number of reference functions in various technological areas, including:

- Pre-normative verification and reference for construction standards (Eurocodes Series). Structural evaluation and testing of structures.
- Benchmark services by establishing composite indicators for the effectiveness of European anti-fraud, financial and fiscal policies.
- Design of new wireless communications compliance testing techniques and protocols.
- Testing and verification of nuclear equipment and nuclear safeguards methodologies.

4.5 Key experimental facilities

- European Laboratory for Structural Assessment – ELSA
- European Microwave Signature Laboratory – EMSL
- Linear Synthetic Aperture high-resolution radar – LISA
- Optical Systems for the Characterization of Surfaces

- Performance Laboratory – PERLA
- Tank Measurement Laboratory – TAME
- Thermal, Electro-Magnetic, Physical Equipment Stress Testing – TEMPEST

4.6 Customers

The Institute's main customers in the European Commission are:

- DG Agriculture (AGRI): management and control of direct aids, crop production forecast, cross-compliance and farm advisory system.
- DG Economic and Financial Affairs (ECFIN), DG Market (MARKT), DG ESTAT, DG EMPL and DG COMP: econometrics, statistical analysis and survey.
- DG Education and Culture (EAC): Research on life-long learning indicators.
- DG Energy and Transport (TREN): Transport accident reporting and analyses, nuclear safeguards, non-proliferation and nuclear security, safety and security of transport and transport infrastructures, cybersecurity of energy infrastructures.
- DG Enterprise and Industry (ENTR): Test and evaluation of wireless technologies, standards for construction and construction products, support to GMES bureau; security (validation, data policy, standards; certification, strategic orientation of security dimension of security-relevant technologies GMES).
- DG Environment (ENV): support to climate change policies, risk analysis for natural and man-made disasters, major accident hazard bureau, tools for crisis preparedness, monitoring and response, contribution to INSPIRE.
- RELEX FAMILY (DGs External Relations/RELEX, Development/DEV, EC Humanitarian Office/ECHO, Europaid/AIDCO, Enlargement/ELARG) : tools against illicit trafficking and proliferation of nuclear materials, support to disaster /crisis management including conflict prevention (early warning/alerting and information management systems; remote sensing based techniques for compliance monitoring, and for damage, humanitarian and reconstruction needs and risk assessment; secure communication), support to rural development and international aid programs (crop production forecasts); migration profiles and roots; approaches for assessing climate change/infectious disease occurrence and transmission patterns.
- DG Fisheries (FISH): Support to resources management (vessel detection system, electronic reporting of fish catches, fish genetic database).

- DG Justice, Freedom and Security (JLS): vulnerability assessment of critical infrastructures, remote sensing for maritime surveillance and interoperability of border security systems, evaluation and testing of security-related technologies, nuclear and radiological vulnerability assessments, cyber-threats and attacks to critical infrastructures, open source intelligence tools and systems to support law enforcement and intelligence.
- European Anti-Fraud Office (OLAF), DG Taxation and Customs (TAXUD), DG TRADE: dual use goods, import/export control, Statistical tools for anti-fraud, containers tracking; route-based risk analysis for maritime container shipments.
- DG SANCO: traceability of meat, livestock and crop products origin. Early warning/alerting and information management systems to support health crisis management (restricted to infectious diseases).
- DG Information Society and Media (INFSO): critical information infrastructure; security and privacy in e-communications; spectrum policy and interference analysis; security and e-Inclusion; biometrics and privacy.

EU Member States also benefit from the Institute's activities, in particular those relating to crises and assessment of medium/long-term threats.

The institute has a strong collaboration with the International Atomic Energy Agency (IAEA) in the area of nuclear safeguards and security as well as with the European Space Agency (ESA). Moreover in the last few years, many more collaborations with (newly created) agencies have been established, namely with Community Agencies such as the Community Fisheries Control Agency (CFCA), European Agency for the Management of Operational Cooperation at the External Borders (FRONTEX), European Aviation Safety Agency (EASA), European Maritime Safety Agency (EMSA), European Railway Agency (ERA), European Centre for Disease Prevention and Control (ECDC), European Environment Agency (EEA), European Network and Information Security Agency (ENISA).

Collaboration is also ongoing with Common Foreign and Security Policy agencies such as the European Defence Agency (EDA), the European Union Institute for Security Studies (ISS), and in particular with the European Union Satellite Centre (EUSC).

In the areas covered by Police and judicial cooperation in criminal matters agencies, such as the European Judicial Cooperation Unit (EUROJUST), the European Police College (CEPOL), and the European Police Office (EUROPOL) JRC-IPSC supplies mainly open source intelligence tools and techniques, in support of their missions.

5. The Institute for Environment and Sustainability (IES)

5.1 Mission

The mission of the IES is to provide scientific-technical support to the European Union's policies for the protection and sustainable development of the European and global environment

5.2 Policy support areas

The institute is engaged in eight main EU policy fields:

- **Sustainable use of natural resources:** community policies related to air, water, forests and soils: Modelling, experiments, consensus building on methods among Member States and production of validated and standardised databases, measurement campaigns and development of information systems; life-cycle assessment.
- **Sustainable agriculture and rural development:** assessment of the impact of agricultural practices on water and soil quality and on the biodiversity of rural areas in the diverse European context; development of environmental indicators.
- **Climate change:** mitigation and adaptation, study of greenhouse gas cycles and evaluation of emission reports; integrated climate impact assessments in agriculture, water resources, air quality, etc.
- **Transport and Air Quality:** assessment of emissions from transport, analysis of alternative/advanced fuels for energy efficiency and environmental impact. Emission measurement systems, emission reduction options and socio-economic analysis of sustainable transport.
- **Environmental risks and natural hazards:** floods, forest fires, droughts, landslides and storms: development of risk mapping, forecasting and impact assessment techniques.
- **Environmental dimension of development co-operation:** development of global monitoring techniques for management of renewable resources (surface water, forests, land use) supporting EU development aid; the African Caribbean and Pacific Observatory (ACP Obs) is an integrated repository and diffusion system for the knowledge accumulated.
- **Global Monitoring for Environment and Security (GMES) and Infrastructure for Spatial Information in Europe (INSPIRE):** hosting of the technical secretariat; the institute is a major contributor

to environmental monitoring and information systems.

- Support during major radiological accidents: the institute is responsible for the scientific and technical development of information gathering, modelling, analysis and distribution systems.



The IES installed Greenhouse Gas Flux Towers in a popular plantation inside the Biosphere Reserve of Parco Ticino (near Pavia, Italy) and uses them to scientifically monitor ecosystem greenhouse gas fluxes.

5.3 Core competences

- Spatial analysis techniques including remote sensing, GIS techniques and information systems
- Reference measurements for environmental monitoring
- Environmental indicators and models, life-cycle assessment
- Monitoring of natural resources (water, forests, soil, air)
- Quality assurance and control of environmental data
- Spatial scenario modelling and analysis
- Integrated risk mapping, impact assessments and forecasting techniques for natural events

- Study of greenhouse gas cycles
- Provision of standardised spatial information through web-based services

5.4 Scientific and technical reference

The institute performs important reference functions for selected technologies and through the validation of environmental information through:

- The independent measurement of emissions from vehicles
- The management of many unique pan-European and global databases and infrastructures (e.g. European Data Centre for Soil, the European Data Centre for Forests, World data centre for aerosols and European radiological Data Exchange Platform)
- Acting as the technical coordinator for the INSPIRE Directive
- European reference Laboratory for Air Pollution (ERLAP)
- Independent verification system for greenhouse gas reporting

5.5 Key experimental facilities

- Vehicle Emissions Laboratory (VELA) offers advanced instrumentation allowing the physical, chemical and toxicological characterization of emissions from all types of transportation.



The Vehicle Emissions Laboratory (VELA), operated by the IES and equipped with the most advanced facilities and instrumentation, allows the testing of the emissions from all types of vehicles and automotive fuels.

5.6 Customers

The institute collaborates with many research partners in the EU Member States and beyond. The

main customers of the institute in the European Commission are:

- **DG Agriculture and Rural Development (AGRI):** Sustainable agriculture, environmental impacts of agricultural practices
- **DG Transport and Energy (TREN):** Monitoring of radioactivity in the environment; policy options in developing sustainable transport systems
- **DG Enterprise (ENTR):** Emissions from vehicles, GMES
- **DG Environment (ENV):** Climate change, environmental risks and natural hazards, INSPIRE, renewable energies, work on air, water and soils, emissions from vehicles, life-cycle assessment, environmental fate of chemicals.
- **DG External Relations (RELEX), DG Development (DEV) and EUROPAID:** Development cooperation, ecosystem monitoring, ACP Obs.
- **DG Justice, Freedom and Security (JLS):** Radiological risk reduction
- **Eurostat (ESTAT):** Environmental data, indicators, life-cycle assessment

The institute also works for DG Information Society (INFOS), DG Health and Consumer Protection (SANCO), DG Research (RTD) and DG Regional Policy (REGIO).

Since 2002, the institute is a member of the Partnership for European Environmental Research (PEER), which is made up of Europe's largest environmental research centres and serves European bodies such as the European Environment Agency (EEA) and the European Space Agency (ESA), as well as global organisations such as the United Nations Environment Programme (UNEP) and the UN Food and Agricultural Organisation (FAO).

6. Institute for Health and Consumer Protection (IHCP)

6.1 Mission

The mission of the IHCP is to protect the interests and health of the consumer in the framework of EU legislation on chemicals, food, and consumer products by providing scientific and technical support including risk-benefit assessment and analysis of traceability

6.2 Policy support areas

The institute applies its scientific expertise to a number of policy domains relevant to consumer protection and health of EU citizens. The main ones are:

- **Chemicals, REACH and Biocides:** The institute supports the implementation of the EU chemicals legislation including biocides. The new chemicals legislation REACH has recently been adopted and the institute via its European Chemicals Bureau (ECB) has played a major role in preparation of guidance documents in collaboration with stakeholders and development of informatics tools. The latter serve as entry for registration, collation and dissemination of information concerning properties of chemicals. The name of the ECB will no longer be used after the official handover to the recently established European Chemicals Agency (ECHA) during 2008. The institute will focus more of its activities on biocides but will continue to provide support to ECHA where required.
- **Alternative Methods to Animal Testing:** The institute hosts the European Centre for Validation of Alternative Methods (ECVAM). ECVAM with its own advisory committee (ESAC) validates approaches that refine, reduce and replace traditional animal methods for toxicity assessment of e.g. cosmetics ingredients and chemicals. This work is pivotal to supporting the implementation of the Cosmetics Directive which foresees an EU-wide ban on animal testing for cosmetic purposes in the near future. Alternative methods also play an essential role in the implementation of the REACH legislation which will require a significant increase of chemicals testing.
- **Consumer Products and Food:** The institute houses the European Community Reference Laboratory (CRL) for food contact materials which supports the National Reference laboratories by providing harmonised analytical tools for

the measurement of substances released from materials into food. The institute also coordinates the network of Member States' Laboratories involved in spectrometric measurements required for the European wine data bank and for other anti-fraud aspects in the area of food. In the field of consumer products, the Institute plays an active role in exposure assessment of chemicals released from e.g. textiles and home furniture.

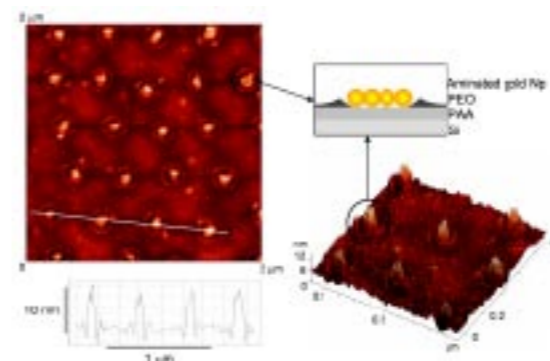
- **GMOs in food and feed:** The institute has for a number of years coordinated the European network of GMO laboratories (ENGL). The network ensures strict and uniform application of the legislation and safeguards, by guaranteeing clear labelling, consumers' rights to choose whether or not to buy GM products. In 2004 the institute was given the mandate of CRL for GM food and feed with the principle task of validating analytical (detection and quantification) methods for GM crops submitted for authorisation for marketing within the EU. It also plays an important role in emergency situations and in supporting Member States in the implementation for the food and feed legislation on GM-related aspects.



Extracting DNA from GM maize to check its genetic stability

- **Health:** Further to the health-related work described above, the institute has for the last few years started to focus on the developing field of nanotechnologies with particular emphasis on the possible toxicological effects of nanoparticles. In particular, the institute applies its expertise in developing models to understand the potential benefits and risks from technologies used for production of consumer products. Support to the Tobacco Directive concerning ingredients and Indoor air pollution monitoring are additional areas of research in health where the institute is involved. Finally, the institute houses a cyclotron

which it uses in its research (e.g. in the field of nanotechnology) as well as in third-party arrangements for the commercial production of radioisotopes for cancer diagnosis.



Gold nanoparticles positioned on a Nanostructured surface to study interaction of nanomaterials with proteins and cells

6.3 Core competences

- Biological, chemical and physical analysis of complex mixtures in different matrices, including GMOs
- Material sciences with focus on surface chemistry and engineering
- Toxicity and exposure assessment of chemicals, including nanoparticles
- Validation of testing methods (chemistry, molecular biology, toxicology)
- Computational sciences (in-silico methods)

6.4 Scientific and technical reference

The institute operates Community Reference Laboratories (CRL) and performs important validation functions at European level through:

- The CRL on food contact materials
- The CRL for genetically modified organisms
- The European Centre for the Validation of Alternative Methods (ECVAM)
- The European Bureau for Wines, Alcoholic Beverages and Liquor (BEVABS).
- The European Chemicals Bureau (until the handover to ECHA)

6.5 Key experimental facilities

- "Indoortron" for studies on indoor air pollution for exposure assessments
- Laboratory for isotopic measurements (NMR)

- Laboratory for automated in vitro assays
- Fully equipped laboratories for studies in toxicity, GMO detection, analytical chemistry (e.g. spectroscopy and chromatography).
- Variable-energy, multi-particle cyclotron (10 – 40 MeV)

6.6 Customers

The national control laboratories for food and consumer products, national reference laboratories and Industry use the methods developed and validated by the institute. The main customers of the institute in the European Commission are:

- DG Agriculture (AGRI)
- DG Customs Tariff (TAXUD) and DG TRADE
- DG Enterprise (ENTR)
- DG Environment (ENV)
- DG Health and Consumer Protection (SANCO)

Other customers are European bodies such as the European Food Safety Authority (EFSA), the European Chemicals Agency (ECHA), the European Committee for Standardisation (CEN) and international organisations such as the World Health Organisation (WHO), the Organisation for Economic Co-operation and Development (OECD) and Codex Alimentarius.

7. Institute for Prospective Technological Studies (IPTS)

7.1 Mission

The mission of IPTS is to provide customer-driven support to the EU policy-making process by developing science-based responses to policy challenges that have both a socio-economic as well as a scientific/technological dimension.



The JRC-IPTS is located in Seville's Cartuja Technological Park

7.2 Policy support areas

The institute applies its “techno-economic” know-how in the following core policy fields:

- Knowledge for growth: focusing on research policy and its interfaces with related policies, especially innovation;
- Information society: focusing on policies to stimulate Europe's uptake of the Information Society and the competitiveness of Europe's ICT industry;

- Competitiveness and sustainability: focusing on the economics of sustainability policies relating to the manufacturing, energy and transport industries;
- Agriculture and rural development: focusing on the economic and social pillars of the Common Agricultural Policy.

The IPTS also has a small group working on the socio-economics of new health technologies.

7.3 Core competences

The business of the institute revolves around the following three broad categories of techno-economic competence:

- Techno-economic analytical studies: these studies are either policy-driven or technology-driven and are usually underpinned by a portfolio of investigative tools which are either:
 - quantitative such as modelling, scenario analysis, econometrics and cost benefit analysis; or
 - expert-based such as technological, economic and social foresight and technology forecasting.
- Techno-economic “bureaux”: the institute drives a complex consensus-building process among stakeholders from all Member States, either in the frame of specific EU legislation or in the frame of the Open Method of Coordination. In all cases, the products are best-practice techno-economic guidelines for application by Member State authorities.
- Techno-economic platforms: the institute provides customers with up-to-date, reliable and accessible information and the tools needed to make use of that information through two main types of services:
 - intelligence services, based on the systematic collection of data, its analysis and its presentation in a relevant and easy to use form. Examples are the ERAWATCH web-based service on research policies, the IRIM platform on corporate investment in R&D, the FOR-LEARN web-based services on foresight, and the REDICT observatory on Europe's ICT innovation system;
 - techno-economic modelling services, offered in the field of agri-economics, energy, greenhouse gases, transport, environmental impact and research investment.

7.4 Scientific and technical reference

The IPTS is working towards becoming a European reference centre for techno-economic modelling, initially in the fields of agri-economic modelling, environmental impact, transport, and energy and climate change.

The IPTS also has a global reputation in foresight as a tool for supporting policy-making.



Studies conducted by the IPTS generally lead to the publication of reports which are freely downloadable from <http://ipts.jrc.ec.europa.eu>

In addition, the European Integrated Pollution Prevention & Control (IPPC) Bureau has become the European reference centre for defining “best available techniques” for pollution prevention and control in the context of the EU's IPPC Directive.

7.5 Customers

The main customers of the institute in the European Commission are:

- DG Research (RTD): techno-economic support to the anticipation, formulation, implementation, monitoring and evaluation of research policies; provision of the ERAWATCH service, the Industrial R&D Investment Scoreboard and the FOR-LEARN foresight platform; and support to the identification of research priorities for the Framework Programme.
- DG Information Society (INFOS): techno-economic support to the anticipation, formulation and monitoring of information society policies; provision of the REDICT platform that maps European investment in ICT R&D.
- DG Environment (ENV): techno-economic support to the anticipation, formulation, implementation, monitoring and evaluation of environmental

policies; provision of a techno-economic modelling platform in the field of energy, greenhouse gases, transport, and environmental impact; development of sustainability impact assessment tools; operation of the European IPPC Bureau.

- DG Agriculture (AGRI): techno-economic support to the anticipation, formulation, implementation, monitoring and evaluation of agriculture and rural development policies; provision of the agri-economic modelling platform; operation of the European Co-Existence Bureau.
- DG Enterprise and Industry (ENTR): techno-economic support to the anticipation and formulation of enterprise policies, particularly in relation to ICTs, innovation policies, new health technologies, climate change and sustainability.
- DG Energy and Transport (TREN): techno-economic support to the anticipation and formulation of energy and transport policies.

Other customers of the institute within the Commission Services are the Secretariat General, DG Health and Consumer Protection (SANCO), DG Education and Culture (EAC), DG Regional Policy (REGIO), DG Employment (EMPL), DG Economic and Financial Affairs (ECFIN), European Anti-Fraud Office (OLAF) and Legal Service (SJ).

Concerning the Member States, they are the ultimate beneficiary of a number of the institute's activities, for example ERAWATCH, FOR-LEARN, and the best practice documents produced by its two bureaux. The institute also networks actively with its peer organisations in the Member States.

Table of abbreviations

Abbreviation	Explanation
ACP	African Caribbean and Pacific
BIPM	Bureau International des Poids et Mesures
CCQM	Comité Consultatif sur la Quantité de Matière
CRL	Community Reference Laboratory
ECCAIRS	European Commission Civil Aviation Incident Reporting System
EUROMET	European Organisation for Metrology
GMES	Global Monitoring for Environment and Security
IAEA-INDC	International Atomic Energy Agency - International Nuclear Data Committee
INSPIRE	INfrastructure for SPatial InfoRmation in Europe
JTI	Joint Technology Initiative
OECD-NEA	Organisation for Economic Cooperation and Development – Nuclear Energy Agency
WENRA	Western European Nuclear Regulators' Association
WPNS	World Programme on Nuclear Safety

IRMM	Institute for Reference Materials and Measurements
ITU	Institute for Transuranium Elements
IE	Institute for Energy
IPSC	Institute for the Protection and Security of the Citizen
IES	Institute for Environment and Sustainability
IHCP	Institute for Health and Consumer Protection
IPTS	Institute for Prospective Technological Studies



