

# JRC Newsletter

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JULY / AUGUST 2010



## The JRC Strategy 2010 - 2020

In 2009, the JRC undertook the challenge of reinvigorating its organisation by the creation of a new vision and strategy for the period 2010-2020. This was necessary to address key societal challenges facing the EU and the world, for which the approach requires integrated, pro-active and cross-policy action. The JRC Strategy thereby contributes strongly to the Europe 2020 strategy and the Commission's research priorities for the years to come. I am very pleased that we have now adopted this document that will guide our work in the coming decade.

This strategy envisages addressing the challenges that societies are facing with increased attention to assessing policy options for key customers instead of focusing solely on sectoral policy support and analysis. It represents significant challenges for the JRC, identifies new goals and objectives and sets a scheme for better addressing policy options at EU and global levels. This means that competences in socio-economic research and modelling will be expanded and integrated with natural science and engineering-based knowledge available.

Many of the complex challenges ahead cut across traditional policy boundaries and require multi-disciplinary research. In order to deliver the best support, the JRC will focus its efforts on seven thematic areas, which respond to major EU and global challenges and take into account the JRC's proven competences. Macro-economic and policy analysis and related impact assessments will receive increased emphasis and a forward-looking capacity will help in anticipating societal, economic, environmental, technical or scientific issues that may in future become relevant to the EU policy-making process.

The development of the document was initiated through a combined bottom-up and top-down consultation process. The JRC's senior management established the priorities for

2010-2020. Following this, twelve expert working groups composed of 150 scientists and support staff across the JRC, representing core competence areas, prepared reports on thematic challenges and customer needs for future science-based policy support. The strategy has furthermore been extensively consulted with the JRC staff, the European Commissioner for Research, Innovation and Science and her Cabinet, the European Commission's Secretary General, key customer Directorates-General, the JRC Board of Governors, and the European Parliament.

*"The JRC's vision is to be a trusted provider of science-based policy options to EU policy makers to address key challenges facing our society, underpinned by internationally-recognised research."*

The next step will be the creation of an implementation plan that will include a new programme-oriented management approach. Elements will be introduced into the JRC's work programme over the next two years with a view to shaping the new JRC profile at the onset of the next Framework Programme. This strategy will be reviewed in 2013 and 2016 with potential modifications driven by policy changes in the EU, while the implementation plan will be updated annually.

Based on its roots in the Euratom Treaty and its expertise and reputation built up over decades in a wide range of thematic areas, the JRC is ready to evolve over the next years into an enhanced scientific organisation ready to fulfil its new vision which is to "be a trusted provider of science-based policy options to EU policy makers to address key challenges facing our society, underpinned by internationally-recognised research".

I wish to sincerely thank all those who have generously contributed their time, energy, enthusiasm and ideas to the conception of the new JRC Strategy.

ROLAND SCHENKEL  
JRC Director General

## A NEW VISION: THE JRC 2010-2020 STRATEGY

In order to reinforce its role as a policy support provider and to be able to address key challenges facing our society, the JRC has adopted a new vision and corporate strategy for 2010-2020. It emphasises the JRC's aim to pro-actively offer identification and analytical comparison of science-based policy options which will enable policy makers to make well-informed choices.

The JRC will provide more integrated and cross-policy analyses delivered by multi-disciplinary research teams and complement its customer-driven approach by a strong forward-looking and horizon scanning capacity. This will be achieved by enhancing the JRC's competences in socio-economic research and computer based modelling.

The JRC will concentrate its activities on seven thematic areas in which it will strive to be pivotal in the policy process:

*Towards an open and competitive economy:* by contributing to the goals of the Europe 2020 Strategy by providing integrated socio-economic and policy support on macro-economic policies, structural reform, employment, education and skills, research and innovation ("Innovation Union").

*Development of a low carbon society:* by addressing energy, transport, clean production technologies and

consumption patterns, issues that will be pivotal to the progressive transition of the EU towards a 'low carbon society'.

*Sustainable management of natural resources:* by addressing issues related to the sustainable management and use of strategic resources such as food, water, air, minerals and land.

*Safety of food and consumer products:* by providing S&T support to EU policies on safety of food and feed, and other new consumer products.

*Nuclear safety and security:* by providing independent and reliable S&T assessment in the fields of nuclear safety, safety of the new generation of reactor technologies, and nuclear safeguards and non-proliferation.

*Security and crisis management:* by contributing to the development of new technological approaches to enhance the security of the citizen, including support to crisis management.

*Reference materials and measurements:* by maintaining a strong reference role in the area of standards and reference measurements.

A summary of the JRC Strategy can be downloaded at <http://www.jrc.ec.europa.eu/strategy>

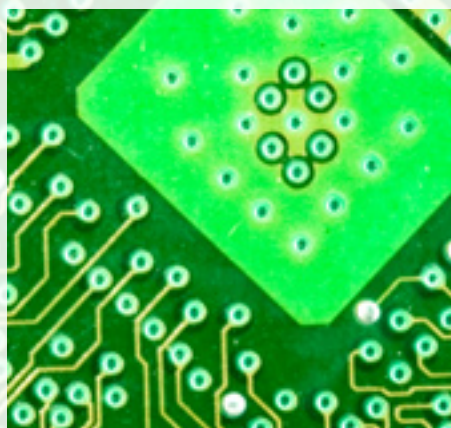
### Towards an open and competitive economy

## COMPETITIVENESS

<http://ipts.jrc.ec.europa.eu/publications/pub.cfm?id=3239>

### ICT account for 25% of total corporate R&D investment in Europe

The Information and Communication Technologies (ICT) sector is by far the largest investor in private research and development (R&D) in the EU, with 25% of total investment in 2007. According to a new report published by the JRC Institute for Prospective Technological Studies (IPTS), the ICT sector's leadership is due to its market dynamism, technological innovative capacity and the fact that ICT fosters competitiveness and productivity in the rest of the economy. In 2007, ICT companies employed 32% of the researchers working in the private sector and



*The ICT sector is by far the largest investor in private R&D in the EU*

accounted for 4.8% of GDP in the EU, while in the US the percentage reached 6.4%.

The work, commissioned by the European Commission's Directorate General for Information Society and Media, focused on three complementary perspectives: national statistics covering both private and public R&D expenditure, company data and technology-based indicators. It relies on the latest available official statistics delivered by the Member States, Eurostat and the OECD.

## INFORMATION SOCIETY

<http://ipts.jrc.ec.europa.eu/publications/pub.cfm?id=3320>

### *Enterprise Search Solutions market could see annual growth of up to 15%*

The Enterprise Search Solution (ESS) market, a digital services market for the easy retrieval of information within organisations, was worth 831 million



*The Enterprise Search Solution (ESS) market was worth 831 million euros in 2008*

Euros in 2008 and has the potential to grow between 10% and 15% every year until 2013, according to a new report published by the JRC's Institute for Prospective Technological Studies (IPTS). The catalytic effect on other markets brought about by this growth is likely to be significant. The report titled, "Economic Trends in Enterprise Search Solutions", highlights how this technology is key to increasing the competitiveness of the digital economy as it renders business more efficient particularly in data-intensive companies. The report reviews the techno-economic developments in the ESS and forecasts a further consolidation of existing ESS actors.

In addition, technical and business alliances involving major European players are also likely to occur, allowing for the pooling of resources for R&D on promising technologies.

The report suggests a higher degree of interoperability, thus reducing the number of barriers to the development of new services and lowering costs for consumers. It also discusses whether support to the development of sub-markets for specific corporate users (small and medium-sized users, not-for-profit organisations, public agencies, etc.) could provide competitive opportunities for European companies.

## Development of a low carbon society

## BIOENERGY

<http://eusoiils.jrc.ec.europa.eu/projects/RenewableEnergy/>

### *Commission sets up system for certifying sustainable biofuels*

On 10 June, the European Commission decided to encourage industry, governments and NGOs to set up sustainability certification schemes for all types of biofuels, including those imported into the EU, by adopting important explanatory communications on the sustainability scheme, and a decision on a carbon stock guideline which lay down what the schemes must do to be recognised by the Commission.

This will help implement the EU's requirements that biofuels must deliver substantial reductions in greenhouse gas emissions and should not come from forests, wetlands and nature protection areas.

The rules for certification schemes are part of a set of guidelines required by the Renewable Energy Directive to explain how the sustainability requirements should be implemented.

The JRC, through its Biofuels Task Force, provided significant input for the formulation of the communications, assisting for example the Commission in designing implementing measures and procedures for the calculation of GHG emissions of biofuel and bioliquids pathways.

Moreover, the methodology to calculate carbon stock changes and the related guidance have been developed entirely by the JRC, based on the comprehensive data layers on climate regions and soil type available at the JRC Institute for Environment and Sustainability.

The JRC Biofuels Task Force, which groups experts across the JRC, produces independent analyses that deal with the greenhouse gas issues of biofuel cultivation and production (including land use change effects, impacts on soils, forests, biodiversity, water etc), the contribution to the security of energy supply, and the potential impact on agricultural commodity markets and employment.



*Only biofuels that meet the EU's sustainability requirements can count towards the EU's renewable energy targets*

## Sustainable management of natural resources

### ENVIRONMENT

<http://edo.jrc.ec.europa.eu/>

#### ***Water scarcity and droughts – a major concern for many areas in Europe***

The European Commission recently published a report on the progress of Member States in addressing water scarcity and droughts. Despite more rainfall in southern European countries in 2009 than in previous years, greater efforts are still needed to stop and reverse the over-exploitation of Europe's limited water resources. An effective water pricing policy, water



*Water efficiency and water saving measures need to be addressed to ensure continued supply of good quality water*

efficiency and water saving measures are essential to ensure that Europe has enough good quality water to meet the needs of users and to face the challenges of a changing climate.

The JRC contributes to the Commission's preparatory activities in view of the 2012 water scarcity and droughts policy review with the development of the prototype of the European Drought Observatory (EDO). The Observatory will give access to drought information from various sources from continental overview level to national and regional level through monitoring and detection of drought events, thus contributing to preparedness and early warning on droughts in Europe. The current version of the EDO map server is available at <http://edo.jrc.ec.europa.eu/>

In addition, the JRC supports the Water Scarcity and Droughts Expert Network within the Common Implementation Strategy of the Water Framework Directive in the development and evaluation of drought indicators in Europe.

The balance between water demand and availability has reached a critical level in many areas of Europe. Water scarcity and droughts have emerged as a major challenge, and climate change is expected to make matters worse. This new report shows that some Member States have begun to suffer permanent scarcity across the whole country. The problem is not limited to Mediterranean countries: the Czech Republic has reported areas with frequent water scarcity, and France and Belgium have reported over-exploited aquifers.

### WASTE MANAGEMENT

<http://susproc.jrc.ec.europa.eu/>

#### ***End of Waste Criteria report as technical basis for bio-waste Communication***

The JRC report on "End of Waste Criteria" contributed to the Communication from the Commission on future steps in bio-waste management in the European Union. The Communication identifies the report as the technical basis for a proposal on standards for compost and digestate. The purpose of defining end of waste criteria is to facilitate and promote recycling, ensuring a high level of environmental protection, reducing the consumption of natural resources and the amount of wastes sent for disposal.

In its Communication the European Commission laid out steps to improve the management of bio-waste in the EU. Bio-degradable garden, kitchen and food waste accounts for 88 million tonnes of municipal waste each year and has major potential impacts on the environment. But it also holds

considerable promise as a renewable source of energy and recycled materials. The Communication promotes actions to unlock this potential by making the best use of existing legislation while giving Member States discretion to choose the options best suited to their individual circumstances. Supporting initiatives at EU level will also be necessary.



*Bio-degradable garden, kitchen and food waste accounts for 88 million tonnes of municipal waste each year*

**ENERGY SECURITY**<http://ie.jrc.ec.europa.eu/activities/SES.php>***Europe-wide power grid model***

As part of the Security of Energy Systems (SES) Action, the JRC's Institute for Energy (IE) has finalised the implementation of a European-wide electricity grid model.

The model was built starting from data officially provided by the European Network of Transmission System Operators, which was complemented by other datasets from the European power system. It includes more than 10,000 elements (nodes and lines) of Europe's transmission grid and can be used to run static and dynamic analyses of the European transmission network via advanced power simulation platforms (based on MATLAB® and NEPLAN®). In addition, the power grid model and tools will enable JRC scientists to provide support to the European Commission's energy department on policies related to critical energy infrastructures, trans-European energy networks and smart grids.

Our ever changing energy demands dictate that developing, and to a certain extent re-designing, our electricity networks will be an imperative step in the pursuit of future competitiveness, sustainability and security of energy supply. The Security of Energy Systems (SES) project aims to address these issues by assessing the vulnerability, reliability and security of supply challenges of EU electricity transmission and distribution systems.



*Electricity grids: assessing vulnerability, reliability and security of supply challenges*

**TRANSPORT**<http://ies.jrc.ec.europa.eu/the-institute/units/transport-and-air-quality-unit.html>***Limiting the CO<sub>2</sub> emissions and fuel consumption of trucks and buses***

Following the adoption of an EU Regulation on reducing CO<sub>2</sub> emissions from passenger cars, the European Commission is now preparing to address the issue of CO<sub>2</sub> emissions from heavy duty vehicles (i.e. trucks, buses, etc.). Road haulage is responsible for around half of CO<sub>2</sub> emissions from road transport in Europe.

On 19 April, a high-level expert group, including representatives from the Commission's Directorate-General Climate Action, the JRC's Institute for Environment and Sustainability, ACEA (the industrial association of European Automotive Manufacturers) and representatives from the US and Hong-Kong met at the JRC in Ispra to discuss the development of a new certification method for CO<sub>2</sub> emissions and fuel consumption from heavy duty vehicles. The methods developed in the US and the Commission's plans and needs were discussed.

In response to this new challenge, the JRC is now building up its capacities in vehicle simulation techniques and modelling, which can give valuable support to planning new legislation aimed at limiting the impact of transport on the climate. These vehicle modelling tools will also be applied in support to the assessment of eco-innovations and for the modelling of fuel consumption, CO<sub>2</sub> emissions, and other emissions by road and non-road transport.

All such studies are backed-up and validated by measurements under realistic and legislative operating conditions carried out at the state-of-the-art testing facilities in the JRC's VELA laboratories in Ispra, Italy. VELA has been a key point of reference for the Commission's proposals regarding European Regulations and Directives on air pollutants and CO<sub>2</sub> emissions from vehicles and engines during the last decade. It currently hosts 7 labs with measurement systems for tailpipe, evaporative emissions and the fuel consumption of advanced vehicle technologies, including hybrid and electric vehicles, small engines, non-road mobile machinery and any kind of on-road vehicles from scooters up to large buses and trucks.



## ENVIRONMENT

<http://www.norman-network.net/>

### *Researching the threat of emerging pollutants*

On 10 June, a collaboration agreement between the JRC and the NORMAN association (Network of Reference Laboratories for Monitoring of Emerging Environmental Pollutants) was signed in Stresa, Italy to improve coordination of research on "emerging pollutants". The signing took place at the joint JRC-NORMAN workshop on river-basin specific pollutants in the context of the European Water Framework Directive.

The main scope of this important collaboration is to enhance the impact and effectiveness of national efforts in generating information about the environmental occurrence and effects of new or so-called emerging pollutants. This is pivotal in deepening the understanding of the scientific,

economic and social issues related to new and less-investigated chemicals entering our natural resources.



*Leen Hordijk, Director of JRC-IES, and Jaroslav Slobodnik, President of NORMAN, signing the collaboration agreement on 10 June 2010*

With this agreement, the JRC enforces its leading position of introducing new options for policies invoking environmental monitoring; the domain of its novel research team, MAPLE (Monitoring Across Policies and Environmental Media) at the JRC Institute for Environment and Sustainability.

NORMAN is a network of reference laboratories, research centres and related organisations for the monitoring of the emergence of environmentally relevant substances. It is a non-profit organisation representing over 45 European key institutes dealing with environmental monitoring.

## FISHERIES

<https://datacollection.jrc.ec.europa.eu/>

### *Working towards more sustainable fisheries in the Mediterranean*

In May 2010, Member States' data on commercial fish stocks in the Mediterranean, together with data on effort trends and landings at fleet level were assembled by the JRC's Institute for the Protection and Security of the Citizen (IPSC) through its dedicated fisheries data collection web site. Thanks to the JRC's persistent efforts and quality checks, more complete and reliable data are now available to support sound scientific advice in fisheries management. Despite shortcomings in the compliance with data call rules,

the JRC's scientists were able to provide the Scientific, Technical and Economic Committee for Fisheries (STECF) working group for the Mediterranean with an increased amount of quality data on stocks compared with previous years.

This success builds on the pioneering STECF work carried out in 2008 and 2009 which aimed to establish scientific evidence to support the development of long-term management plans for selected fisheries in the Mediterranean, and to strengthen the Community's scientific input to the work of the General Fisheries Commission for the Mediterranean (GFCM). In 2009 this involved data compilations and assessments for 59 combinations of demersal (i.e. the species that live in closer vicinity with the seabed, e.g. hake, red mullet, red shrimps, common sole) and small pelagic (such as anchovies and sardines) species, and for Geographical Sub-Areas (GSAs) which indicated overfishing for most stocks and recommended reductions in catches and fishing mortality in the short term.

Over 54% of the Mediterranean fish stocks analysed by scientists are found to be fished to well above sustainable harvest levels. The EU 'Mediterranean Regulation', in force since 1 June 2010 for Member States bordering the Mediterranean basin, aims to improve the management of fisheries to help them become more sustainable, protect the fragile marine environment and restore fish stocks to healthy levels.



*54% of the Mediterranean fish stocks analysed by scientists are found to be fished to well above sustainable harvest levels*

## Safety of food and consumer products

### INTERNATIONAL COLLABORATION

<http://ihcp.jrc.ec.europa.eu/>

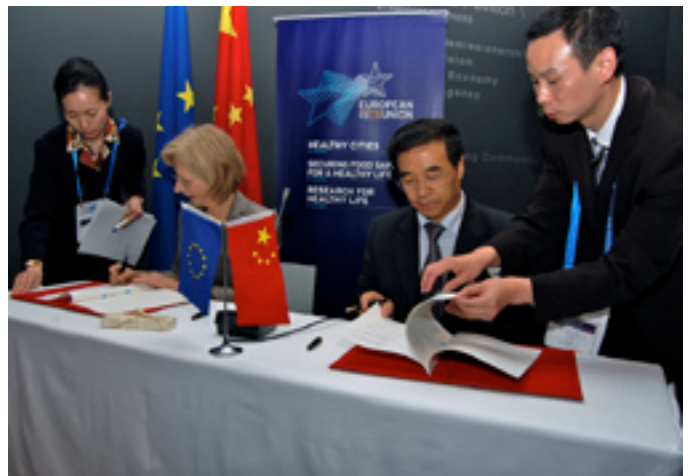
#### *JRC-China collaboration for consumer protection kicked off in Shanghai*

The Chinese Academy of Inspection and Quarantine and the JRC Institute for Health and Consumer Protection (IHCP) have kicked off collaboration to support risk management and improve consumer protection through new approaches in the areas of nanotechnology and alternative methods to animal testing. On 6 June, the organisations have signed a Memorandum of Understanding at the occasion of the EU-China Food Safety Scientific Seminar at the Shanghai World Expo. Both institutions provide technical support for policy makers and aim to reinforce their co-operation in scientific research for consumer products safety.

Nanotechnology is increasingly exploited in the development of novel and improved products and applications in areas as diverse as medicine, biotechnology, electronics, materials science, and energy technologies. The rapid increase in the utilisation of nanoparticles in industry and in consumer products is, however, causing concerns regarding the potential effects on health and on the environment. With today's globalisation of markets, food safety or consumer protection are no longer domestic issues, but need to be addressed in international collaboration.

The JRC-IHCP has several years of experience in the field of nanotechnology, in particular regarding research in the safety assessment of nanomaterials, where it assesses

the potential risks of particulate nanomaterials due to uptake and subsequent potential adverse effects on living tissue. The institute develops and uses the state-of-the-art computational and in vitro techniques to analyse the interaction of nanoparticles with cells and proteins. The IHCP has also a long tradition and expertise in the field of alternative methods to animal testing. The institute carries out scientific validation of alternative methods to animal testing developed and submitted by research laboratories.



*Elke Anklam, Director of JRC-IHCP and Huailin Li, President of the Chinese Academy of Inspection and Quarantine, signing the MoU on 6 June*

## Nuclear safety and security

### NUCLEAR SECURITY

<http://silab.jrc.ec.europa.eu/>

#### *New technologies for nuclear safeguards*

Nuclear safeguards are measures which verify that nuclear materials are properly accounted for and are not diverted to undeclared uses. Safeguard applications require highly specialised and secure systems for sealing, tracing and tracking, and providing continuity of knowledge in safeguarded installations.

##### *JRC ultrasonic seals installed in Pakistan*

In April 2010, a team from the JRC's Seals and Identification Techniques Laboratory (SILab) went to Karachi,

Pakistan to help install a new ultrasonic sealing system for the spent fuel bay of KANUPP (Karachi Nuclear Power Plant). This sealing system, based on the JRC Candu Sealing System already in use in Romania (Cernovoda), was developed and adapted for KANUPP by scientists at the Institute for the Protection and Security of the Citizen.

Due to the hostile environmental conditions inside spent fuel bays (high level of radiation from the nuclear fuel, moisture due to underwater storage and high temperature), conventional

sealing techniques cannot be employed. The main characteristics of the ultrasonic sealing system installed are simplicity, reliability over time and resistance to these harsh environments. The system consists of cavities randomly manufactured into a piece of stainless steel. These cavities can be read using an ultrasonic probe giving a unique signature for each seal. This signature is stable with time and in the presence of a high radiation flux and can be read even 100 years later and still yielding the same answer. The seal also contains a special integrity feature enabling

the ultrasonic detection if the seal has been opened.

After the completion of the first installation of these seals, the SIlab team provided a training course for the IAEA inspectors and to the KANUPP operators who will handle the system in future. A part of the training was devoted to the transfer of knowledge to the Pakistani operators regarding the non-sensitive parts of the sealing system, which they will themselves manufacture.

*EDAS: Practical demonstration of a novel nuclear safeguards concept*

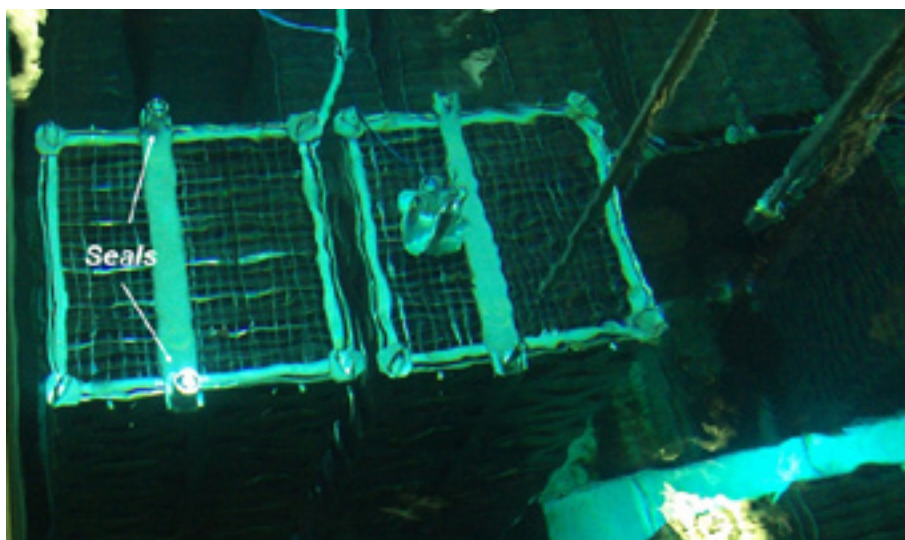
A practical demonstration of the capabilities of a novel device for sharing nuclear power plant sensory information for safeguards purposes, the Enhanced Sensor Authentication System (EDAS), was recently carried out. The demonstration concluded that EDAS is an enabling technology for the wide implementation of the "Shared-Use" concept.

Within the Safeguards R&D collaboration agreement between the US DoE and the EURATOM Community; Sandia National Laboratories (Albuquerque, NM), the Commission's Energy Directorate-General and JRC-IPSC have

engaged in a collaborative project aimed at sharing sensor data from a plant operator owned instrument, EDAS. To this effect, sensor data is authenticated and given a safeguards value at source. This concept has been titled "Shared-Use". The concept has the potential to collect a large amount of nuclear power plant information at a reduced cost and will also improve the Safeguards inspectorate's understanding of the plant's real-time process operation conditions.

The Commission's Energy Directorate-General and JRC-IPSC have actively

contributed to the functional and architecture specifications of EDAS, a dedicated prototype hardware device capable of buffering operator's process data, authenticating, encrypting and transmitting data to a safeguards secure machine. The practical demonstration of the data accuracy, data completeness, data authenticity and data confidentiality capabilities of EDAS consisted of connecting the instrument to different types of devices (process control pressure sensors and a surveillance laser measurement system).



*JRC Kanupp sealing system for nuclear fuel: left rack already sealed, right rack is being sealed*

## NUCLEAR ENERGY

<http://www.snetp.eu/>

### *European gas-cooled fast reactor*

The partners of the collaborative project on the European Gas-cooled Fast Reactor (GoFasteR) met in Manchester end of March to agree the terms of their collaboration. Within this project the JRC's Institute for Transuranium Elements will, together with the Nuclear Research and consultancy Group (NRG), lead a work package that addresses key issues on nuclear fuel and other core materials.

The fission chain reaction in a gas-cooled fast reactor is sustained by high energy fast neutrons, as opposed to moderated thermal neutrons in more conventional reactors. Also,

in contrast to most present-day nuclear reactors, a fast reactor uses a coolant that is not an efficient moderator so the neutrons remain longer at high-energy. Gases with low neutron capture cross sections allow for this and for higher operating temperatures, increasing thermal efficiency.

On average, more neutrons per fission are produced using this system. Fast reactors can produce more neutrons than needed to maintain the chain reaction, so that they breed more fuel than they consume, making them able to utilise fissile and fertile materials more efficiently than thermal

spectrum systems. Excess neutrons also help to minimise the production of long-lived radioactive waste through transmutation.

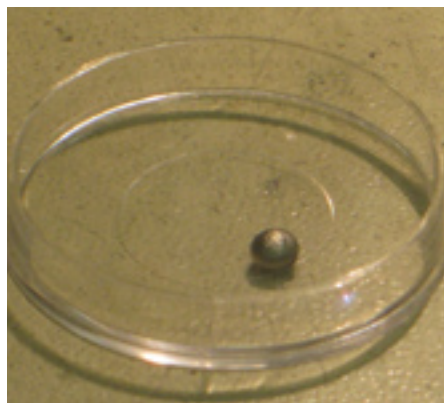
The project, which is scheduled to run for three years, is coordinated by AMEC and aims to demonstrate the viability of the Gas-Cooled Fast Reactor system as a more sustainable version of the Very High Temperature Reactor (VHTR). GoFasteR will contribute to the framework of the Generation IV research programme and is aligned with the objectives of the strategic research agenda of the European Sustainable Nuclear Energy Technology Platform.

## ACTINIDE RESEARCH

<http://itu.jrc.ec.europa.eu>

### *Electrochemical method for the preparation of actinide metals*

Scientists at the Joint Research Centre's Institute for Transuranium Elements (ITU) have developed a



*Ingot of Plutonium-242 (mtot = 651.2 mg)*

method for preparing high purity actinide metal samples which are essential in many of the ITU's research programmes on actinide materials.

The method is based on the electrochemical reduction of actinide-mercury amalgams and will allow for both more flexibility in the quantities of material being used and produced, and for faster and easier access to various actinide isotopes without the risk of cross-contamination.

Actinide metals are seldom readily available at high purity levels and their preparation can require heavy and complex high temperature processes.

The electrochemical reduction method developed by JRC scientists has been optimised for the laboratory-scale production of these high purity transuranium metals and so will help ensure the continuous supply of high quality materials for their research programmes.

This method has already been applied to uranium and neptunium and has, more recently, been used at the ITU in the production of plutonium-242. Analysis indicated that a yield of pure plutonium higher than 95% was produced. The success of this method constitutes essential progress in supporting the ITU's research programmes on actinide materials.

## Security and crisis management

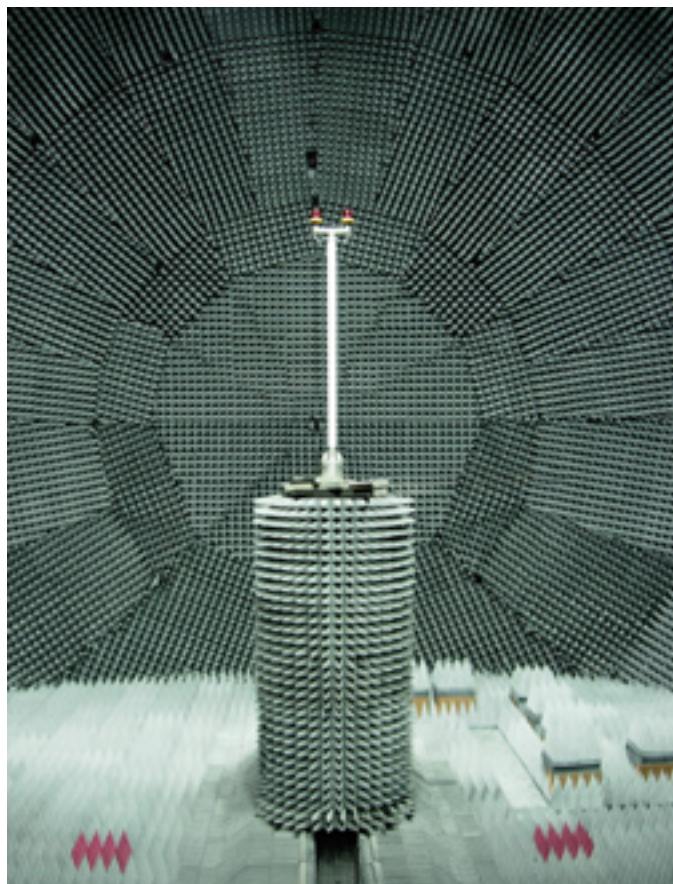
## BORDER SECURITY

<http://emsl.jrc.ec.europa.eu/>

### *Prototype for moving target detection*

Research carried out at the Institute for the Protection and Security of the Citizen (IPSC) led to a working prototype of a device which is able to track multiple moving targets and can also distinguish between a man and an animal. This prototype is based on an innovative use of multiple antennas arranged in an array of transmitters and receivers, known as MIMO (multiple-input multiple-output) radar. As the production costs are very low and its performance in target detection is very high, it could also be employed for green border surveillance and critical infrastructure perimeter monitoring. A number of companies expressed their interest in commercialising this novel technology in partnership with end users, the border control authorities in Member States. Technical solutions such as this one will be needed to implement the European external border surveillance system (EUROSUR) initiative.

The prototype was developed in IPSC's European Microwave Signature Laboratory (EMSL). This laboratory is the main experimental facility of the JRC's Sensors, Radar Technologies, and Cybersecurity Unit, based in Ispra, Northern Italy. Since its inauguration in 1992, experimental work at the EMSL has been focused on themes at the forefront of radar signature research, putting its unique measurement capacities at the service of remote sensing applications and industrial customers.



*The European Microwave Signature Laboratory at JRC-IPSC*

## Other news

### NUCLEAR PHYSICS

<http://prl.aps.org/pdf/PRL/v104/i19/e19720>

#### ***Superexchange Coupling and Slow Magnetic Relaxation in a Transuranium Polymetallic Complex***

Scientists at the JRC's Institute for Transuranium elements have studied, in  $\{NpVIO_2Cl_2\}\{NPVO_2Cl(thf)_3\}_2$ , what seems to be the first example of a polymetallic transuranic complex displaying both slow relaxation of the magnetization and effective superexchange interactions between 5f centres.

The coupling constant for NpV - NpVI pairs and the dynamic magnetic

properties displayed, suggest that future actinoid-based molecular magnets will have very different behaviour to that of lanthanoid-based clusters.

Following the discovery of slow magnetic relaxation and quantum tunneling in Mn<sub>12</sub>, polymetallic complexes displaying intramolecular exchange coupling have attracted considerable attention from physicists and chemists

alike. Unique applications have been envisaged for them, from the implementation of quantum computing algorithms exploiting the superposition of single particle quantum states to such diverse fields as magneto-caloric refrigeration and spintronic. These results in particular suggest that actinide-based Single Molecule Magnets (SMMs) could be obtained leading to the realisation of ultra-high density memory components.

### OUTREACH ACTIVITIES

<http://itu.jrc.ec.europa.eu>

#### ***Members of the European Parliament visit ITU***

On 19 May 2010, five Members of the European Parliament (MEPs): Jan Březina, Edit Herczog, Alajos Mészáros, Vladimir Urutchev and Oldřich Vlasák, along with members from the European Atomic Forum (FORATOM), visited the JRC's Institute for Transuranium Elements and received an "on the spot" insight into the JRC's research activities. The focus of this visit was to demonstrate the JRC's competences in nuclear waste management, nuclear safety and security, and key interdisciplinary activities such as actinides science and medical applications.

The MEPs and FORATOM representatives alike expressed a

great interest in the thematic areas presented and gained a much better understanding of the importance of the JRC's research activities. Ms Herczog stressed the necessity for Member States to be able to rely on an independent and competent organisation such as the JRC at an EU level, especially when addressing such concerns as nuclear safety and security.

The MEPs also expressed their wish to more widely inform other MEPs of the goings on at the JRC, perhaps in the form of a presentation at the European Parliament. This exposure would be an addition to the contribution of the "Forum for the Future of Nuclear

Energy", which was set up in October 2003 to provide MEPs and civil servants with a platform in which open and objective discussions on nuclear energy issues can take place.



MEPs Herczog (Chair of the delegation) and Březina signing the ITU Golden Book at the Hot Cells Laboratory

### JRC GOVERNANCE

<http://ec.europa.eu/dgs/jrc/index.cfm?id=1480>

#### ***Dr Killian Halpin re-elected Chairperson of the JRC Board of Governors***



Dr Killian Halpin,  
Chairperson of  
the JRC Board of  
Governors

Dr Killian Halpin (Ireland) was re-elected Chairperson of the JRC Board of Governors at its last meeting in Oslo (Norway) on 17 June 2010. This will be Dr Halpin's second three-year term of service as the Chairperson.

On the same occasion, the JRC Board of Governors elected Ms Kerstin Eliasson (Sweden) as Deputy Chairperson and Dr Hans Peter Jensen (Denmark) as Delegate to the High Level Users Group.

## PUBLICATIONS

[http://ec.europa.eu/dgs/jrc/index.cfm?id=2820&obj\\_id=504&dt\\_code=HLN](http://ec.europa.eu/dgs/jrc/index.cfm?id=2820&obj_id=504&dt_code=HLN)

### *Institute reports of IES and IPSC available*

The annual report 2009 of the Institute for the Protection and Security of the Citizen (IPSC) and the new brochure of the JRC Institute for Environment and Sustainability (IES), 'Science for the environment', are now available.

The IES brochure gives an insight into many activities and achievements of the IES over the past two years. It is divided into four main chapters dealing with environmental issues associated with prosperity, security, solidarity and those which have a global perspective. The brochure includes a general overview of the Institute, information

on the Institute's partners and feedback from customers, and sets out some of the challenges for the future. In an attempt to reach a wider audience, explanations of scientific and technical terms are also provided.

The IPSC Annual report highlights the major achievements and resources related to the Institute's work during 2009. An overview is given of IPSC mission and its implementation, the scientific activities and the relations with the outside world.



*IES and IPSC have published their latest Institute reports*

## AWARDS & PRIZES

### *Material science*

Vincenzo Rondinella, Dimitrios Papaioannou, Ramil Nasyrow and Jean-Paul Glatz from the JRC Institute for Transuranium Elements (ITU) have received, together with their co-authors, the 2009 Significant Contribution Award by the Materials Science and Technology Division of the American Nuclear Society for their paper entitled "Characterization of Metallic Fuel for the Transmutation of Minor Actinides in Fast Reactor".

The Award recognizes the authors that have presented the best materials-oriented paper at either the Annual or Winter ANS Meetings in the field of materials science and technology contributing to the development of nuclear energy.

The minimisation of the long-term radio toxicity of high level nuclear waste is a high priority criterion common to advanced nuclear fuel cycle concepts for the new generations of nuclear power reactors. Separation from spent fuel and subsequent recycling of Pu, U as fuel, and transmutation of Minor Actinides (MA: Np, Am, Cm) in fast reactors and/or MA burners are deemed necessary steps to achieve this goal. Oxides and non-oxide compounds such as metal alloys, nitrides and carbides are considered as possible nuclear fuels. The award paper presents results from the METAPHIX programme, a collaboration between the ITU and the Central Research Institute of Electric Power Industry (CRIEPI, Japan) devoted to the study of minor

actinides-containing fast reactor metal fuels. The study includes fabrication, irradiation (at the Phenix reactor, CEA-France), post-irradiation examination and finally pyrometallurgy reprocessing of the fuel: today METAPHIX is possibly the only ongoing experimental demonstration project of a closed nuclear fuel cycle worldwide.

### *Measurement science*

**Harald Muellejans, Roberto Galleano and Wim Zaaiman** from the JRC Institute for Energy (IE) were awarded the outstanding paper prize 2009 by *Measurement and Science Technology* for their paper "Analysis and mitigation of measurement uncertainties in the traceability chain for the calibration of photovoltaic devices".

Since 1991, Measurement Science and Technology has awarded a Best Paper prize. The Editorial Board of this journal nominates papers in four subject categories: Fluid Mechanics; Measurement Science; Precision Measurements; Sensors and Sensing Systems; and Optical and Laser-based Techniques.



*The Hot Cells group at JRC-ITU*

## NOMINATIONS

<http://www.ilsa.org/Europe/>



**Jörg Stroka** from the JRC Institute for Reference Materials and Measurements (IRMM) has been nominated Member of the ILSI expert group on mycotoxins, a new expert group in ILSI that will deal with masked (hidden) mycotoxins that mostly escape from conventional mycotoxin analysis, an issue of emerging interest for consumer safety. Mycotoxins are toxins produced by mould.

In addition, he recently became the Chair of the Mycotoxins Community within the Association of Analytical Communities (AOAC International).

Jörg Stroka is a food chemist by education and started his career with the food inspection service in Germany, before joining the JRC in 1996. He has since worked on food and feed safety issues related to mycotoxins and since 2006 he is managing the activities of the EU Reference Laboratory for mycotoxins at the JRC in Geel, Belgium.

<http://www.rsc.org>



**Hendrik Emons**, Head of the Reference Materials Unit at JRC-IRMM, has become a Fellow of the Royal Society of Chemistry. The Royal Society of Chemistry (RSC) is the largest organisation in Europe for advancing the chemical sciences.

The Fellow designation is awarded in recognition of those who have made an outstanding contribution to either i) the advancement or application of chemical science, ii) the chemical science profession or iii) the management or direction of an organisation in which chemical science is important.

## EVENTS

### EU SCIENCE & TECHNOLOGY WEEK

SHANGHAI, 15-18 JUN 2010 **CN**

<http://www.jrc.ec.europa.eu/expo2010>

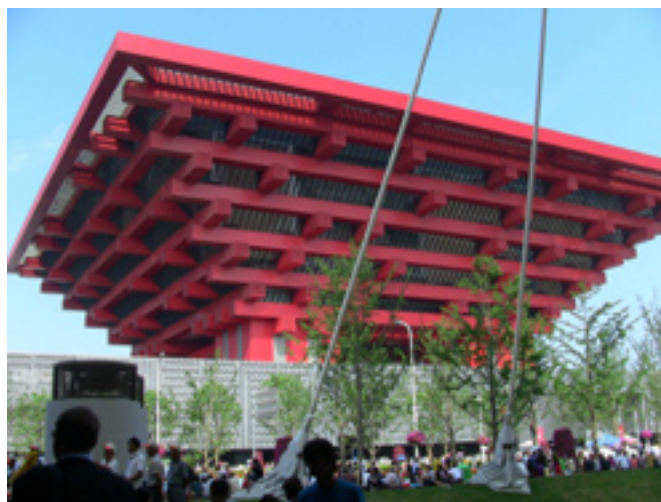
In the frame of the World Expo 2010, taking place in Shanghai from May to October 2010, the JRC and its partners – including the Chinese Academy of Science, Tongji University, China Atomic Energy Agency – have presented and debated ongoing research in the fields of disaster management and nuclear energy. The event was opened by Stephan Lechner, Director of the JRC Institute for Protection and Security of the Citizen, and Guo Huadong, Director-General of the Centre for Earth Observation and Digital Earth, Chinese Academy of Sciences and addressed an audience of 150 distinguished participants from research bodies, industry and government agencies.

Building on an expanding cooperation in this field, speakers from China and from the JRC shared their views and recent research results in the fields of nuclear security as well as safety of current and future nuclear power plants. China and Euratom have recently signed an agreement on

nuclear research in which they agreed to collaborate on all issues concerning the peaceful use of nuclear energy. In addition, they are both Members of the Generation IV International Forum. Furthermore, China and EU are among the few major actors in nuclear security, and enhanced co-operation is expected in this field as well.

The speakers in the session on disaster risk mitigation and response discussed how the EU-China cooperation is contributing towards increased societal resilience by means of new approaches in the areas of seismic vulnerability of structures and construction standards, as well

as new methodologies for analysing data from satellite sensors for disaster risk assessment and for post-disaster damage assessment to support reconstruction planning and recovery. An intense debate focused on the valuable lessons that researchers and government agencies have learned from the disastrous Wen Chuan earthquake of 2008.



China Pavilion at World Expo 2010

## JRC INFORMATION EXCHANGE DAYS IN SPAIN AND NORWAY

MADRID, 2 JUN 2010  
OSLO, 18 JUN 2010

ES  
NO

<http://www.jrc.ec.europa.eu>

The JRC, together with the European Union Satellite Centre (Torrejón), hosted an Information Exchange Day with Spanish stakeholders in Madrid on 2 June. More than 100 high-level participants from government, research and industry gained insight into the JRC's new ten-year strategy and work done by its Institutes.

Speaking at the event, Spanish Secretary of State for Research Dr Felipe Péttriz Calvo praised the valuable research done by the JRC and expressed his wish for an enhanced collaboration

of Spanish institutions with the organisation.

The emphasis of the day's programme lay on the application of technology to address grand challenges facing society today. This included presentations by JRC speakers and partners on climate change, nanotechnology, remote sensing and applications such as the European Forest Fire and Drought Information Systems, agriculture and fisheries.

A similar event took place in Oslo on 18 June, organised together with the

Research Council of Norway. The event was opened by the Norwegian State Secretary for the Minister of Higher Education and Research, Mr Kyrre Lekve, who expressed his wish for an enhanced collaboration of Norwegian institutions with the JRC.

Speakers from the JRC and from Norway presented their main activities in fields of common interest, in particular energy and climate change. The programme focused more specifically on environmental friendly energy research.

## TEN YEARS OF ON-SITE LABORATORIES

KARLSRUHE, 15 JUN 2010

DE

<http://itu.jrc.ec.europa.eu/index.php?id=190>

On 15 June, the JRC Institute for Transuranium Elements, the Commission's Directorate-General for Energy and the International Atomic Energy Agency celebrated the 10th anniversary of the On Site Laboratories at the nuclear reprocessing plants of Sellafield (UK) and La Hague (France).

The JRC operates the On Site Laboratories at reprocessing plants in the nuclear sites of Sellafield and La Hague to analyse samples of spent fuel in situ. The throughput of these plants represents 80% of the world's reprocessed spent nuclear

fuel, which is verified by European Commission inspectors and supported by JRC scientists in order to assure its compliance with nuclear safeguards. Thanks to its expertise in this field, the JRC was involved in the set up of the only other similar facility in the world which is located (outside the EU) in Rokkasho (Japan). In addition, the JRC also provides training to Euratom and the International Atomic Energy Agency's (IAEA) safeguards inspectors.

From the 2000 tons of spent fuel which are reprocessed every year in Sellafield and La Hague — equivalent to the consumption of 70 reactors — the JRC's Institute for Transuranium Elements (JRC-ITU) performs on average 800 sample analyses per year, checking both input and output. Following these tests, Euratom inspectors from the Commission's Directorate-General for

Energy evaluate the results to assure that the nuclear material is only used for declared, peaceful purposes.

The set up of the On Site Laboratories at the Sellafield and La Hague reprocessing plants 10 years ago has drastically reduced the transport of radioactive samples. The laboratories at these two largest European reprocessing plants were set up by the JRC-ITU and the Euratom Safeguards office which was in charge of their design and installation. The inauguration took place on 13 October 1999 in Sellafield and on 6 June 2000 in La Hague. Since then, the On Site Laboratories have been operated by JRC-ITU personnel on behalf of the European Commission's Directorate-General for Energy.

Before the construction of the On Site Laboratories, this approach required that a large number of samples be transported to the JRC-ITU for analysis. The need to draw timely verification conclusions, the high related cost and logistical difficulties encountered to organise the sample transports led to a revised approach: the analysis of nuclear materials directly on the production site.



The ten year anniversary celebration took place at the Schloss in Karlsruhe

## UPCOMING

# SOIL, CLIMATE CHANGE AND BIODIVERSITY – WHERE DO WE STAND

DE

[http://ec.europa.eu/environment/soil/biodiversity\\_conf.htm](http://ec.europa.eu/environment/soil/biodiversity_conf.htm)

BRUSSELS, 23-24 SEP

The Commission's Environment Directorate-General and the JRC's Institute for Environment and Sustainability will host a high-level conference on soil, climate change and biodiversity in Brussels on 23-24 September 2010.

The conference will see the participation of scientists and researchers who will report on the latest scientific findings on issues such as the amount of carbon stored in European

soils, the role that agricultural and forestry practices can play in climate change mitigation and biodiversity protection, and the important function that soil biodiversity plays in the ecosystem. Under the title "Soil, climate and biodiversity: synergies and opportunities" a roundtable discussion will gather key policy players from international and European institutions.

# SENSITIVITY ANALYSIS OF MODEL OUTPUT

MILAN, 19-22 JUL 2010

IT

<http://samo2010.unibocconi.it/>

The conference is organised by the JRC Institute for the Protection and Security of the Citizen (IPSC) and the Bocconi University - Milan.

Modelling activities are steadily increasing in all scientific disciplines, ranging from financial to environmental assessments. Sensitivity analysis is crucial both in the modelling phase and in the interpretation of model results. Sensitivity analysis contributes to

model development, model calibration, model validation, reliability and robustness analysis, decision-making under uncertainty, quality-assurance, and model reduction.

The SAMO conference is devoted to advances in research on sensitivity analysis methods and their interdisciplinary applications. The SAMO conferences are held every three years. The aim of the SAMO conferences is to bring together users

of sensitivity analysis in all disciplines of science. Sensitivity analysis methods are powerful tools in physics, operations research, chemistry, biology, engineering, environmental science, nuclear and industrial safety, economics and finance.



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**Institute reports**

The annual report 2009 of the Citizen (IPSC) and the Environment and Sustainability are now available. 28/06/10 [visit more](#)

**Dr. Kieran Halpin re-elected Chairman**

Dr. Kieran Halpin (Ireland) was re-elected of Governors at its last meeting in Oslo (NO) 2010. This will be Dr. Halpin's second three Chairmanship. 24/06/10 [visit more](#)

**Integrative search facilitates market of**

The Enterprise Search 2.0 for the data network of

**Official News**

- New EU labelling rules including new EU organic logo come into force on 1 July 2010
- 2010 European aid record how EU's action helps the poorest countries to develop
- Pesticides: Food in the EU is now safer thanks to more controls and fewer and less
- Europeans are more interested in science than sport and music EU research
- Commission and US agree to cooperate on civil aviation research and development

**Up to 85% services market**

EU will extend 85%

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Consult current calls for tender:

<http://www.jrc.ec.europa.eu/callsfortender>

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<http://www.jrc.ec.europa.eu/jobs>

## RECENTLY PUBLISHED

(Applicants must submit their application no later than the indicated deadline)

Ispira, Italy**Trainee**

- IHCP: traineeships in several areas related to health aspects – 10/10/2010

**Seconded National Expert**

- Development of new pedotransfer rules and thematic spatial databases for soil water modeling on catchment to continental scales – 01/09/2010

**Grantholder (Post-doc researcher)**

- Land Management and Natural Hazards - Desertification Land Degradation and Drought in Latin America – 04/08/2010
- Sustainability Assessment - Linking Land Use, Soil Functions and Biodiversity Impacts in Life Cycle Assessment – 04/08/2010

Petten, The Netherlands**Seconded National Expert**

- Hydrogen safety sensor testing – 01/09/2010

**Grantholder (Ph.D Student)**

- Security of Energy Supply – 09/07/2010
- Severe accident analyst – 15/07/2010

**Grantholder (Post-doc researcher)**

- Security of Energy Supply – 09/07/2010

Seville, Spain**Grantholder (Post-doc researcher)**

- Policy Mixes for Joint Programming and Foresight Action - ERA Policies – 18/07/2010
- Review of the Reference Document on Best Available Techniques – 18/07/2010

- Sustainable Production and Consumption: Environmental Techno-economic analysis – 18/07/2010
- Techno-Economic Assessment of eID Services – 18/07/2010

**Grantholder (Senior researcher)**

- Analysis of the European Research Area – 18/07/2010
- Industrial Research and Innovation – 18/07/2010
- Quantitative Analysis of Agricultural Policies – AGRITRADE – 18/07/2010
- Quantitative Analysis of Agricultural Policies – SUSTAG – 18/07/2010
- Techno-Economic and Quantitative Assessment of European and non-European ICT Poles of world-class Excellence – 18/07/2010

Karlsruhe, Germany**Traineeship**

- DNA extraction from radioactively contaminated forensic evidence – 27/08/2010
- Design of an exhaust gas monitor for the Kora device – 27/08/2010
- Review of experimental Data from an ongoing project: NIMPHE 2 – 27/08/2010

**Research fellowship**

- Investigation of 5f electronic structures by x-ray spectroscopy techniques – 15/08/2010
- CERMET Fuels - FUTURIX - Closing the Fuel Cycle – 27/08/2010
- Long-term behaviour of actinide microparticles subject to environmental degradation – 27/08/2010

**Research fellowship (Senior scientist)**

- Ab initio calculations of the electronic structure in strongly correlated materials – 26/07/2010

The JRC Newsletter is a bi-monthly publication intended to provide JRC customers, stakeholders and other interested parties with an overview of recent highlights from the JRC's scientific achievements, policy support, contributions to events and other news.



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.

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