

# JRC newsletter



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# The importance of international science cooperation



Derek Hanekom, Minister of Science and Technology of the Republic of South Africa

**“International cooperation in science and technology /.../ facilitates improved understanding, communication and friendship between nations and peoples.”**

From a South African perspective, cooperation with the Joint Research Centre (JRC) is one of the cornerstones of our strategic science and technology partnership with the European Union. I therefore appreciate the opportunity to contribute an editorial message for the JRC’s newsletter.

In November last year, I was honoured to host Commissioner Geoghegan-Quinn in South Africa for a series of events, which marked 15 years of implementing the South Africa-EU Agreement on Scientific and Technological Cooperation. On that occasion we expressed our commitment to building on the successes of the past, and expanding and deepening our cooperation. I was therefore delighted that, less than a month after the Commissioner’s visit, a collaboration arrangement between the JRC and the South African National Space Agency (SANSA) was signed. Focused principally on cooperation in Earth observation to support, for example, disaster prevention and the management of natural resources, the JRC’s cooperation with SANSA is an excellent example of collaboration aimed at putting science and technology at the service of society.

The JRC’s mission to harness scientific knowledge and expertise to inform policy and decision-making in support of sustainable development is one with which South Africa is able to associate fully. We are therefore keen to encourage enhanced cooperation between the JRC and South African institutions with similar mandates, such as our Council for Scientific and Industrial Research (CSIR). The main societal challenges confronting our planet, such as fighting pandemic disease, improving food security, increasing the efficiency of renewable energy, protecting biodiversity, addressing climate change, supporting sustainable livelihoods and alleviating poverty, all require a concerted research and innovation effort. These are shared global challenges and cannot be addressed by nations or regions in isolation. International cooperation in science

and technology is a critical component of the response required. In this regard, the JRC should be lauded for its exemplary initiatives to foster a diverse, rich range of international partnerships, of which South Africa is privileged to form part.

Whether within the context of our bilateral South Africa-EU partnership, or within the framework of the Joint Africa-EU Strategy, or as part of different multilateral alliances, South Africa is keen to step up its cooperation with the JRC. We are ready to contribute our experience and expertise as part of joint knowledge-generation efforts. Our cooperation should extend to ensuring that science-based information and advisory products and services are more readily available to governments and user communities who need them. We should also exploit opportunities for capacity-building, including through training and staff exchange programmes.

As global citizens, with inextricably linked destinies, we share the considerable responsibility to promote sustainable growth, enhance environmental protection and improve the quality of life of people worldwide. Despite many scientific and technological advances, our planet during these early years of the 21st century is a fragile one in many respects. Reinforced global partnership and solidarity is essential if we are to enhance our collective resilience and achieve the objectives of the global sustainable development compact. International cooperation in science and technology will not only provide us with instruments with which to achieve these objectives, but also facilitate improved understanding, communication and friendship between nations and peoples. The case for partnership is therefore compelling. It is a cause espoused with vigour and commitment by South Africa and, we know, by our valued partners, the JRC and the European Commission.

**Derek Hanekom,**  
Minister of Science and Technology  
of the Republic of South Africa

## Scientific cooperation agreement with South Africa’s National Space Agency

The JRC has signed a collaboration agreement with the South Africa’s National Space Agency (SANSA) aiming to better exploit remote sensing technologies for monitoring atmospheric, terrestrial and marine environments.

The agreement aims to achieve a better understanding of dynamics and evolution of our natural environment through optimal exploitation of Earth observation data and to develop technologies and services which support national and international policies.

## Meeting of senior officials of the Carnegie Group countries, World Bank and UN

“Joint action and investment are more efficient, more effective and more relevant” was one of the key messages expressed by Máire Geoghegan-Quinn, Commissioner for Research, Innovation and Science, while addressing a meeting of senior officials and experts representing the European Commission, Carnegie Group countries (G8+5), the World Bank and the United Nations. Initiated by the Commissioner herself and hosted by the JRC on 6 December 2012 in Brussels, the meeting addressed the growing challenges facing disaster response.

Partnership to enhance science, cooperation, communication and capacity in early warning at all levels for all hazards was echoed throughout. Furthermore, the Commissioner expressed the necessity to identify an appropriate mechanism that instils international solidarity to close the gaps on definitions, standards, guidelines and methodologies in the areas of loss of lives, disaster exposure and multi-hazard risk assessment.

The JRC’s Director General, Dominique Ristori, concluded the meeting, highlighting the following



Commissioner Máire Geoghegan-Quinn, JRC Director General Dominique Ristori, and South African Ambassador to Belgium Mr. Nkosi at the recent event on natural disasters.

key points: more science is needed to further develop expertise in disaster management, the need for more solid data and modelling and finally that the link between science and policy as well as science and society should be reinforced. Based on its scientific experience and existing collaborations, the JRC would be well positioned to strengthen the international links between the scientific community and policy makers.



## JRC signs cooperation agreement with Brazil

In the context of the 6th EU-Brazil Summit held in Brasilia, the JRC and the Brazilian Ministry of Science, Technology and Innovation (MCTI) signed a Cooperation Arrangement. This commitment strengthens and further defines cooperative activities in the areas of disaster prevention and crisis management; climate change and sustainable management of natural resources and ecosystem services; energy, including bioenergy and smart grids; food security; bioeconomy; information and communication technologies (ICT), as well as nanotechnologies. In addition, the collaboration foresees the exchange of personnel and scientific information, reciprocal access to laboratories and infrastructure and support of training and joint research.

This Arrangement is a follow up to the Letter of Intent signed during the 5th EU - Brazil Summit in October 2011. It builds on the success of the cooperation in the area of disaster prevention and

mitigation and the assistance the JRC provided to the creation of CEMADEN (Brazil’s National Centre for Disaster Monitoring and Early Warning of Natural Disasters). It also confirms the engagement of training and cooperation activities between the JRC and MCTI under the Brazilian Mobility Program ‘Science without Borders’.



The Brazilian Minister of Science, Technology and Innovation, Marco Antonio Raupp, and JRC Director General Dominique Ristori, having signed the Cooperation Arrangement.

## *E-mobility and smart grids: Making mobile pollution a thing of the past*



*Work carried out at the JRC's Vehicle Emissions Laboratory monitors emissions in all types of vehicles, helping to support the European Commission's goals in achieving sustainable transport in Europe.*

Mobility has become a distinctive trait of modernity, as well as of personal freedom. Everyone wants to be able to drive whenever and wherever they feel like, as safely and comfortably as possible. Unfortunately, this modern privilege has come with an environmental price-tag: fossil-fuelled cars are among the biggest sources of CO<sub>2</sub> emissions.

The European Commission aims to reduce the share of conventionally fuelled cars in urban environments to 50% by 2030 and to phase them out by 2050. European collaboration is thus crucial to achieve this goal. With an automotive industry searching for new business opportunities, conditions are very favourable for an e-mobility boom. There is certainly no lack of fresh ideas in this dynamic sector: electrochemically improved batteries, ever better electric motors, lighter car structures and bodies, advanced charging possibilities and flexible car ownership concepts.

E-mobility could satisfy our need for environmentally-friendly mobility. Indeed, electric vehicles have the potential to reduce both greenhouse gas emissions and noise levels. Cars with electric engines improve energy efficiency substantially, and even make it possible to recuperate energy during slow-down. Moreover, e-mobility has economic and political advantages. The electrification of vehicles can tap new markets, for instance, and oil dependency could be reduced.

The JRC has invested massively into new research activities and laboratories - in order to test the

### Read more:

- Driving and parking patterns of European car drivers – a mobility survey. DOI: [10.2790/7028](https://doi.org/10.2790/7028)
- Attitude of European car drivers towards electric vehicles: a survey. DOI: [10.2790/67556](https://doi.org/10.2790/67556)

### Electric vehicles fit mobility habits of European car drivers

Most existing driving patterns of European car drivers are compatible with the use of electric vehicles, according to a JRC-led survey carried out in six EU countries (France, Germany, Italy, Poland, Spain and the United Kingdom), which together account for 75% of the new passenger cars sold in the EU in 2011.

The main purpose of the study was to set up representative driving profiles, which can be matched with charging profiles of electric vehicles. The results of the study show that electric vehicles fit mobility habits.

The average daily distance of the drivers that participated in the survey lies between 40 and 80 km, a range that can comfortably be covered by currently available electric vehicles. The parking time between several car trips during the day amounts to 6 hours, suitable for topping up the charge. After the last trip of the day, the car is usually parked

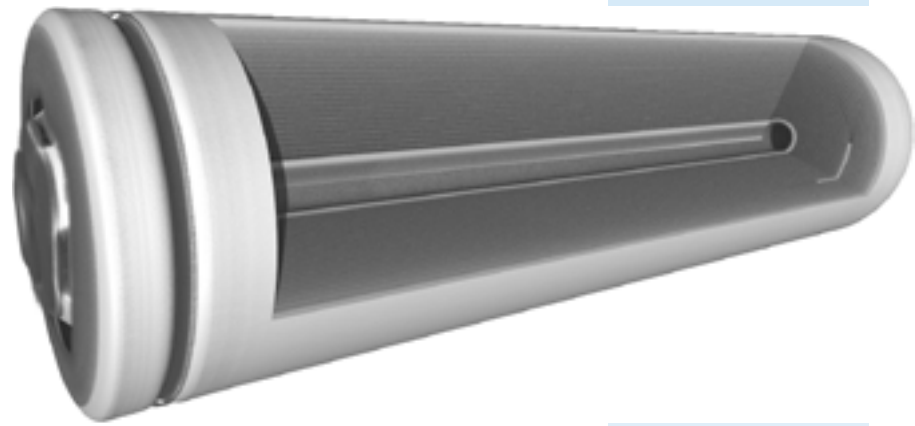
for more than 16 hours, a more than sufficient duration for a full slow recharge of an electric vehicle battery. The survey also showed that drivers do not use their cars significantly more on weekends, so electric vehicles could also cover the typical driver needs on Saturdays and Sundays.

The JRC also looked into the attitudes towards electric vehicles in the countries: car drivers see the opportunities electric vehicles can offer (little noise, zero emissions), but a number of pre-requisites, such as a lower price and an improved driving range, need to be fulfilled before they consider electric vehicles as a credible choice. In addition, many car drivers state that they lack information about electric cars, especially typical recharging time and costs. This indicates that there is a need for demonstration activities in order to increase public awareness of electro-mobility.

usability and reliability of new electric vehicles, their batteries and related grid infrastructures, and to assure their safety and interoperability. In 2012, the JRC signed a letter of intent with the US Department of Energy to work with the Argonne National Laboratory on the interoperability of electric vehicles with smart grids. For many years before that, the JRC has been playing an important role in scientifically preparing the ground for establishing norms, in the European Union and world-wide, regarding conventional vehicle emissions, vehicle testing methodologies, energy storage and improved electric grids.

Electric vehicles will, indeed, only be as climate-friendly as the electricity they are charged with. It is therefore important to increase the use of electricity from renewable energy sources, through enhanced interoperability of the e-cars with the electric grid (see box).

Hence, before e-mobility can really take off, interoperability rules and standards are needed. Standards for such new technologies, and for electric charging stations, do not appear from nowhere: they have to be elaborated with tests in laboratories, with electric vehicles on the road and linked to the grid. The development of a network of electric vehicles which are connected



*X-ray image of a lithium-ion battery using JRC's Computed Tomography System.*

to a smart power grid by communication technologies that allows optimised recharge planning, requires mutual agreements between actors. New measurement rules and standards have to be agreed upon by all involved experts, ideally at global scale. Ultimately these agreements should result in investments into new, sustainable products and infrastructures, adequate and economically viable. In addition to theoretical and modelling studies, the JRC also supports the European position for the international definition of new standards, norms, and where necessary, legislation.

## Vehicle laboratories turn electric

The JRC's Vehicle Emission Laboratories (VELA) are equipped with state-of-the-art roller benches and instrumentation, able to measure the environmental impact of all classes of vehicles, from small mopeds to big trucks. The work on e.g. particulate matter and NO<sub>x</sub> emissions, unburned hydrocarbons, CO<sub>2</sub> and energy efficiency is both performed in standardised test cycles, and real-life conditions on the road.

## When grids get smart

To fully exploit the energetic and environmental potential of e-mobility and renewable energy, smart electric power grids are needed. Smart grids not only permit metering the energy intelligently, they also offer two-way communication between users and producers. Digital and automatic data exchange between big power stations, grids, and users permits to foresee supply and demand at all times.

A 2012 JRC study on the smart grid projects of EU member states shows the dimension of investments at stake: in the last decade, more than € 5,5 billion

For electro-mobility, major upgrades and new laboratories were planned and specified during 2012. In 2013 the JRC will for instance expand its capacity to test electrical vehicles under realistic winter conditions; to measure electromagnetic compatibility of electric cars under a full load, and to analyse hybrid heavy vehicles, charging infrastructure and the interoperability of ICT devices to be used in cars.

were allocated to ca. 300 projects. According to conservative estimates, investments into smart grids until 2020 will reach € 56 billion. The JRC continues to monitor the smart grids to identify problems or potential synergies, delivering all involved actors the information which supports investments.



### EV component and battery testing

*Electric vehicles store energy for traction in on-board batteries and other energy storage components, e.g. supercapacitors and hybrid capacitors. The JRC is about to start a research project on battery energy storage testing for safe electric transport, which will perform pre-normative research in support of the deployment of batteries for vehicle traction. For this purpose an energy storage testing complex for performance testing and safety assessment of E.V. energy storage systems is being established. It will test the performance of battery cells and battery packs, and will also test battery cell abuse (mechanical, electrical and thermal abuse testing of battery cells.*

Read more:  
The 2012 EU Industrial R&D Investment Scoreboard: [http://iri.jrc.ec.europa.eu/research/docs/2012/SB2012\\_final\\_draft.pdf](http://iri.jrc.ec.europa.eu/research/docs/2012/SB2012_final_draft.pdf)

Read more:  
[http://ec.europa.eu/enterprise/policies/innovation/policy/regional-innovation/index\\_en.htm](http://ec.europa.eu/enterprise/policies/innovation/policy/regional-innovation/index_en.htm)

Read more:  
[http://ec.europa.eu/education/news/rethinking\\_en.htm](http://ec.europa.eu/education/news/rethinking_en.htm)  
<http://crell.jrc.ec.europa.eu/>

## *Despite crisis, top EU firms invest in innovation*

In the face of the continuing economic and financial crisis, major EU-based firms continue to rely on research and development (R&D) for their competitive edge. They increased R&D investment by 8.9% in 2011, up from 6.1% in 2010. The increase nearly matches US firms (9%), beats the global average (7.6%) and is far ahead of Japanese companies (1.7%). R&D-intensive sectors tended to show above average employment growth. These are key findings of the European Commission's 2012 "EU Industrial R&D Investment Scoreboard" of the top 1500 global R&D investors equivalent to almost 90%

of the total expenditure on R&D by businesses worldwide.

In the EU, R&D growth figures in 2011 are to a large extent driven by the automobile sector (16.2% growth), which accounts for the biggest share of R&D investment in the EU (25%). Companies based in Germany, which account for around one third of the EU's total private R&D investment, increased R&D by 9.5%. Companies in the UK and France, which also account for a large proportion of private research, had growth of 13.1% and 7.6% respectively.

## *Monitoring innovation in EU regions*

Europe's Regional Innovation Scoreboard 2012, published on 6 November 2012, reveals much diversified regional innovation performance both across the continent and within Member States, and shows that the most innovative regions in the EU are typically in the most innovative countries: Sweden, Denmark, Germany and Finland.

Produced by the Commission's Directorate-General for Enterprise and Industry, in collaboration with the JRC and other organisations, the scoreboard provides a comparative assessment of how European regions perform with regard to innovation. It is

based on the methodology of the Innovation Union Scoreboard and covers 190 regions across the EU, Croatia, Norway and Switzerland.

The most diverse score in innovation concerns France and Portugal: in both countries the performance of regions (including overseas territories) ranges from innovation leaders to modest innovators. Capital regions are usually the national innovation leaders and in some cases, such as in Czech Republic and Portugal, the capital regions greatly outperform the national average innovation performance.

## *JRC supports new education strategy*

To make sure education delivers the right skills needed for the labour market, the European Commission in November 2012 launched a new strategy called Rethinking Education. The strategy aims to bridge the gap between a youth unemployment rate close to 23% and 2 million job vacancies that cannot be filled.

Developed with the support of JRC's analysis on policy reforms and education systems in the EU member states, the proposal encourages national authorities to take action and ensure that young people develop crosscutting skills and competences at all levels, especially entrepreneurial and IT, in order to find a rewarding job.

The JRC's Centre for Research on Lifelong Learning (CRELL) co-authored two studies in support of the setup of the Commission's strategy. The first provides country analysis summarising the performance and policy reforms of the member states. The second study introduces an education and training monitor, a new analytical tool that allows for a comprehensive overview of the core indicators on education and training systems in the EU, facilitating the comparison of progress as well as the identification of the immediate challenges for different countries.



## Boosting glass recycling – end-of-waste criteria adopted

A new regulation for end-of-waste criteria for glass cullet came into force on 31 December 2012. It will contribute to assure a second life for bottles and other glass containers. The criteria were drawn up by the JRC, and state that glass cullet must comply with specifications or standards so that they can be used directly in the production of glass substances or objects by re-melting in glass manufacturing facilities. Among other things, they limit the amount of contaminants such as metals, organics and stones which can be contained in glass cullet in order for it to be classed as a secondary raw material.

The JRC, together with multiple working groups consisting of experts from EU countries and stakeholders, assists the Commission in the preparation of criteria for several material streams that are particularly important for EU recycling markets. The end-of-waste concept aims to stimulate European recycling markets by

creating legal certainty, removing unnecessary administrative burden and releasing safe and clean secondary raw materials from the waste process.



*The end-of-waste regulation will facilitate glass recycling.*

## Best available technologies for heating and cooling

Every year, over 40% of total energy consumed in Europe is used for heating, both at domestic and industrial levels. The cooling demand is growing exponentially, for instance in food production and food storage. In this context, the JRC has published a study on “Best available technologies for the heat and cooling market in the European Union”.

These technologies have been selected by an interdisciplinary group of experts from the JRC, Bio Intelligence Services and the Danish Technological Institute. The study shows that these technologies can significantly reduce the primary energy demand and CO<sub>2</sub> emissions. For instance, the EU’s demand of energy for heating purposes could be reduced between 7% and 11%

by 2050, depending on their market penetration.

The report covers energy technologies used in district heating (including combined heat and power generation), manufacturing industry, services, homes and finally agriculture and fisheries. The descriptions of the technologies include the advantages and disadvantages.



## How do production, consumption and trade affect the use of resources and pollution?

The JRC has just published a series of indicators on “global resources use and pollution”, which provides a holistic approach to the analysis of the global environmental impacts by linking the consumption and production activities, and taking into account the international flows of goods and services.

Data is based on different analyses derived from the FP7-funded project World Input-Output Database (WIOD). The geographical scope includes the EU-27 Member States plus Brazil, China, India, Japan, Russia, the United States and the rest of the world. The time frame covered is the period between 1995 and 2008.

Read more:

- Commission regulation (EU) 1179/2012 of 10 December 2012 establishing criteria determining when glass cullet ceases to be waste

- End-of-waste activities at the JRC:  
<http://susproc.jrc.ec.europa.eu/activities/waste/>

Best available technologies for the heat and cooling market in the European Union.  
DOI: 10.2790/5813

Read more:

Link to Vol 1:  
<http://ipts.jrc.ec.europa.eu/publications/pub.cfm?id=5860>  
Link to Vol 2:  
<http://ipts.jrc.ec.europa.eu/publications/pub.cfm?id=5861>

## Contributing to EU water protection efforts

Read more:  
[http://ec.europa.eu/environment/water/blueprint/index\\_en.htm](http://ec.europa.eu/environment/water/blueprint/index_en.htm)

The JRC recently published two new assessments on the effectiveness of various measures to improve water availability and water quality by 2030.

These assessments were carried out in support of the European Commission's "Blueprint to Safeguard Europe's Water Resources". Ensuring

good quality water in sufficient quantities for all legitimate uses is a major policy aim of the European Commission.

Using state-of-the-art land use projections and hydrochemical modelling, the JRC has developed an environmental modelling tool to assess optimum combinations of measures for water retention, water savings and nutrient reduction for continental Europe to 2030. Simulations were carried out to assess the effects of these measures on several hydro-chemical indicators, such as the water exploitation index, environmental flow indicators, nitrate and phosphate concentrations in rivers, and flood risk. Economic losses due to water scarcity were also taken into account for several sectors, namely agriculture, manufacturing industry, energy-production and households.

The JRC assessments reveal that significant water savings can be made if water-saving measures are implemented in households, more efficient use is made of irrigation water, and water is re-used in industry. They also show that potential flood damages can be reduced by greening cities, re-meandering rivers and improving crop practices.



*A study carried out by the JRC shows that best available technologies can significantly reduce the primary energy demand and CO<sub>2</sub> emissions.*

## Global estimates of carbon stock changes in living forest biomass

Read more:  
 Petrescu et al (2012), BG,  
<http://www.biogeosciences.net/9/3437/2012/bg-9-3437-2012.pdf>

Emissions from land-use change and forestry, including forest fires, peat fires, post-burn decay and carbon stock changes in 2010 accounted for about 21% of the total man-made CO<sub>2</sub> emissions. Since the Kyoto Protocol was drafted, countries have been divided over how to incorporate forest protection into global emission-reduction plans. Negotiators at the United Nations Framework Convention on Climate Change (UNFCCC) are examining a major forestry issue relevant for the post-Kyoto agreement, namely the reduction of emissions from deforestation and forest degradation in developing countries.

Parties to the UNFCCC are required to provide annual estimates of greenhouse gas (GHG) emissions, following the latest approved methodological guidance by the International Panel on Climate Change (IPCC). The current study aims to consistently estimate the carbon stock changes from living forest biomass for all countries of the world. In order to derive comparable estimates for developing and developed countries, it is crucial to use a single methodology with global applicability. Results obtained by the different methods can differ by 40 %. Therefore, the JRC's Emissions Database for Global Atmospheric Research (EDGAR) has

been extended with CO<sub>2</sub> emission estimates from land use, land-use change and forestry (LULUCF), to help monitor this diverse and challenging sector consistently worldwide.

The emissions coming from the carbon stock changes in living forest biomass are amongst the most varying man-made sources varying over space and time, but the JRC-study estimated those across all world-countries in a consistent way from 1990-2010.



*The JRC's Emissions Database for Global Atmospheric Research (EDGAR) now incorporates CO<sub>2</sub> emission estimates from land use, land-use change and forestry.*



## Binders don't mask mycotoxin presence in animal feed

Mycotoxins – harmful substances produced by fungi – are often found in animal feed. They have potential serious effects on the health of animals by increasing the incidence of diseases, damaging



Research carried out by the JRC supported the decision to allow mycotoxins binders as food additives, as they do not mask the presence of mycotoxins in food.

vital organs and interfering with reproduction, which in turn have significant impacts on the economic productivity of the animals. EU legislation therefore sets maximum limits for the level of mycotoxins allowed in feed.

Since 2009, feed producers are allowed to add so-called mycotoxin binders to the feed to reduce the potential risks. These binders bind mycotoxins and reduce their absorption from the gut, promote their release from the system and can also alter the properties of the mycotoxins, therefore protecting animals and humans. The JRC has carried out research to verify that the feed additives do not mask the presence of mycotoxins, which would make them undetectable using chemical methods and allowing unfit feed to enter the market.

In a recent article in the journal “Food Additives & Contaminants”, the JRC scientists detail the results of their research, and conclude that the use of the binders had no significant impact on the measurement results.

Read more:  
Evaluation of the effect of mycotoxin binders in animal feed on the analytical performance of standardised methods for the determination of mycotoxins in feed.  
<http://www.tandfonline.com/doi/abs/10.1080/19440049.2012.720035>

## Shellfish certified reference material to enhance food safety

A new certified reference material (CRM) extracted from mussels establishes certified values for cadmium, mercury, lead and other 10 elements, being therefore a useful tool for laboratories to develop reliable testing methods and control the quality of measurements for food safety.

Mussels are among the most popular shellfish among European consumers and maximum levels for contaminants in this species are set by EC regulation 466/2001. The CRM was produced from wild mussels grown in European waters,

with levels of contaminants below regulatory limits. It can also be used for the validation of measurements of trace elements in shellfish other than mussels (*mytilus edulis*) due to the similarity of the behaviour of tissue from different shellfish species during the analytical process.

The new CRM is called “ERM-CE278k Mussel Tissue” and provides values for a greater number of elements, allowing therefore a wider variety of laboratory uses. The certified values are based on an intercomparison of expert laboratories of demonstrated competence.

## New guidebook to calculate health impact of noise

New guidance will help national authorities in the EU to assess the health impact of noise by calculating citizens' years of lost life as result of premature death or poor health and disability. The “Methodological guidance for estimating the burden of disease from environmental noise”, co-authored by the JRC and the World Health Organisation (WHO), aims to provide strong health-based arguments to policymakers for stringent control of noise pollution. It was released on 14 December 2012. The report – describing how to calculate the burden of cardiovascular diseases and sleep

disturbance from noise – is the result of a two year study conducted by a group of international experts from the JRC, WHO and the European Environment Agency (EEA). It is a step forward from the “Burden of disease from environmental noise” published by WHO and JRC in 2011.

The 2011 publication revealed that at least one million healthy years of life are lost among the urban population of the EU due to noise, placing noise as the second most dangerous environmental hazard to people's health after air pollution.

Read more:  
[http://www.euro.who.int/\\_\\_data/assets/pdf\\_file/0008/179117/Methodological-guidance-for-estimating-the-burden-of-disease-from-environmental-noise-ver-2.pdf](http://www.euro.who.int/__data/assets/pdf_file/0008/179117/Methodological-guidance-for-estimating-the-burden-of-disease-from-environmental-noise-ver-2.pdf)

## Air and climate research in support of policy



*Elisabetta Vignati, Head of Air and Climate at the JRC's Institute for Environment and Sustainability (IES).*

**“Change is opportunity, and I want to identify and embrace this opportunity”. This is scientist Elisabetta Vignati’s approach to the future challenges and changes that her research team – JRC’s Air and Climate unit – will face.**

Elisabetta Vignati always knew what she wanted to do when she grew up; she wanted to find the answers to the question “why?”. To do this, at least in the scientific field, you need to understand the phenomena that occur, for example in physics. She initially wanted to become an astronomer, but during her university studies she realised that studying atmospheric science might be more fulfilling. After obtaining her degree in physics she moved to Denmark where she worked in the National Environmental Research Institute (NERI). She started out working on urban air quality modelling but soon realised that the answers to her question “why?” could only be found in the real world. This led her to start analysing experimental data and to do a PhD on ‘Modelling interactions between aerosols and gaseous compounds in the polluted marine atmosphere’. Her eagerness to understand the world and the phenomena that occur in the environment brought her to the JRC to carry out post-doctoral research in modelling the atmospheric processes involving particles at the microphysical scale.

Today, Elisabetta Vignati is Head of the Air and Climate Unit at the JRC’s Institute for Environment and Sustainability (IES). Her aim is to provide scientific support to policy making in this field. Her team evaluates the emissions of greenhouse gases and air pollutants on European and global scales, using among other tools the Emissions Database for Global Atmospheric Research (EDGAR), an online emissions database which records and maps atmospheric emission trends

in greenhouse gases and other air pollutants that result from human activities. These emissions are closely linked. For instance, black carbon and ozone can have harmful impacts on human health and ecosystems, while at the same time contributing to climate change. Black carbon is the product of the incomplete combustion of fossil fuels and biofuels. Its dark colour absorbs sunlight, thereby leading to increased atmospheric warming. This phenomenon is particularly visible and harmful in the Arctic region where black carbon deposits on the snow and ice accelerate the melting process. The good news is that black carbon particles and ozone have a very short lifetime (ranging from hours to days), so a reduction of emissions will very rapidly have benefits for climate and air quality.

The JRC was closely involved in the Integrated Assessment of Black Carbon and Tropospheric Ozone project with twelve global partners, including UNEP, NASA and the Stockholm Environment Institute. The main goal was to investigate emission reduction measures which can lead to an improvement in air quality and also benefit the climate. The research, which Elisabetta Vignati considers “an example of excellent science in support to policy making”, showed that reduction of methane and black carbon emissions, alongside substantial CO<sub>2</sub> emission reduction measures, would most probably limit global warming to under 2°C over the next 60 years as compared to pre-industrial times. The project resulted in a scientific paper entitled ‘Simultaneously mitigating near-term climate change and improving human health and food security’ that was published in *Science* in January 2012. This project had a huge impact on policy and inspired the foundation of the Climate and Clean Air Coalition to Reduce Short Lived Climate Pollutants (CCAC).

The Air and Climate Unit also hosts the European Reference Laboratory for Air Pollution (ERLAP). Member State reference laboratories carry out Inter-comparison Exercises (IE) on air pollutant measurements at the ERLAP facilities in order to ensure the harmonisation of air pollution measurements and the correct implementation of air quality legislation in the EU.

“Above all, it is fundamental to carry out science for citizens and for policy makers. It is only by giving the findings of our research as input to EU policies on air quality and climate change that our work can gain that rewarding added value that can inspire future projects”, states Elisabetta Vignati.

## Monitoring human exposure to chemicals in food across the EU



*The JRC will host the Flavours, additives and food contact materials exposure task (FACET) tool.*

To estimate the exposure to chemicals in food, an EU funded project has produced a food chemical exposure surveillance system which

contains information on the levels of food additives and food packaging migrants, as well as corresponding food consumption data. As a partner organisation in the project, the JRC provided the experimental data for the validation of models to predict migration from food contact materials. The JRC will host and maintain the software and the databases, envisaged to be publicly available in the second quarter of 2013.

The Flavours, additives and food contact materials exposure task (FACET) tool contains databases of chemical concentrations for flavourings and additives, chemical occurrence data, industry data on retail packaging composition, and food consumption diaries. The databases are combined in probabilistic dietary exposure models that estimate exposure in different populations of consumers in the EU. The tool was developed by 20 partners across the EU over four years, including industry, academia, public research centres and SMEs. It represents a first ever effort to monitor contemporarily a series of chemicals instead of only a specific group. Its use would support EU regulatory authorities in enhancing protection of consumers' health.

Read more:  
[http://ihcp.jrc.ec.europa.eu/our\\_activities/food-cons-prod/chemicals\\_in\\_food/FACET/the-facet-project](http://ihcp.jrc.ec.europa.eu/our_activities/food-cons-prod/chemicals_in_food/FACET/the-facet-project)

[http://ihcp.jrc.ec.europa.eu/our\\_activities/food-cons-prod/chemicals\\_in\\_food](http://ihcp.jrc.ec.europa.eu/our_activities/food-cons-prod/chemicals_in_food)

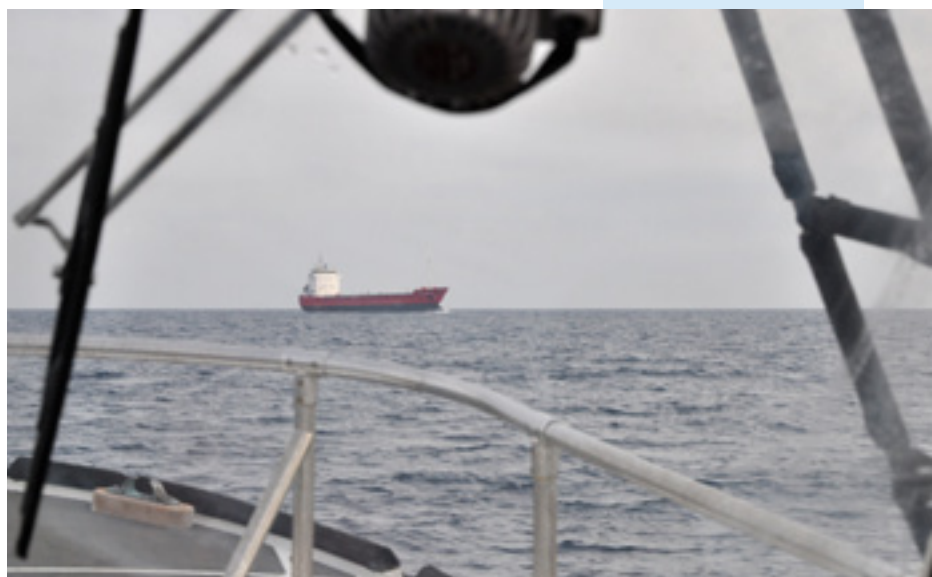
## Supporting the fight against piracy off African coasts

A JRC developed prototype software identifying ship positions in real-time will be tested by Kenya in an EU effort to support efforts to combat piracy in the Western Indian Ocean. Developed upon request by the Commission's Directorate General Development and Cooperation – EuropeAid, the software system is a result of a two-year study carried out by JRC researchers. This tool, known as Piracy, Maritime Awareness and Risks (PMAR) system, was presented on 21 November 2012 at an EU workshop held in Mombasa, Kenya. It will now be tested by the Kenyan Maritime Authority.

The PMAR system integrates data from vessel reporting and earth observation systems into one single maritime picture, integrating a wide array of available data. It shows estimated ship positions in real-time, with an update every 15 minutes. It can also produce maps of historic piracy risk occurrence and ship traffic density. The system can also be used for other purposes such as monitoring migration flows or combating illegal fisheries.

The EU workshop was attended by decision makers in maritime administrations and coast

guards from Comoros, Djibouti, India, Kenya, Maldives, Mauritius, Mozambique, Réunion, Seychelles, and Yemen, as well as representatives of regional organisations, the EU, the U.S. and the International Maritime Organisation (IMO).



*As a result of a two-year study carried out by the JRC, software will soon be tested in Kenya in an effort to combat piracy.*

Read more:  
<https://bluehub.jrc.ec.europa.eu/>

## *JRC-developed laser-based systems approved by IAEA*

Nuclear safeguards are measures to verify that States comply with their international obligations not to divert nuclear materials from their (peaceful) intended use. The need for such verification is reflected in the Treaty on the Non-Proliferation of Nuclear Weapons (the NPT).

The International Atomic Energy Agency (IAEA) has the mandate to ensure that safeguards agreements are effectively implemented.

The JRC has developed a laser-based system (3DLR) that creates accurate 3D models of nuclear facilities, both indoor and outdoor, and is able to detect and spot any change to the millimetre. The 3DLR laser based system was introduced in 2003 in order to support design information verification activities in

large and complex nuclear facilities. Based on laser technologies, JRC has also developed the Laser Item Identification System (L2IS). The purpose of the L2IS is to assist inspectors in identifying and tracking UF<sub>6</sub> cylinders during their movements between process and storage areas at an Enrichment Plant in Japan. The L2IS has been designed and built specifically for this facility. With further modifications, subject to new authorisation, the instrument can be used for other types of cylinders and/or in other enrichment facilities.

The 3DLR and L2IS have successfully passed vulnerability assessments and extensive field tests. As a result they were authorised by the IAEA for routine safeguards use in November 2012.

## COOPERATION AGREEMENTS

### *Enhanced collaboration with the Ministry of Environment in Baden-Württemberg*



Dominique Ristori, JRC Director-General, and Franz Untersteller, Minister for the environment, climate and energy management of Baden-Württemberg signed on 13 November a Letter of Intent which will strengthen the links between the organisations and develop a more structured co-operation process.

Among the key priorities for collaboration are renewable energy and smart grids (also in the field of nuclear safety and security), sustainable management of natural resources, environmental research and technology, scientific support to the Danube Strategy and climate change mitigation and adaptation.

Moreover, particularly important are the topics of innovation, science and research for competitiveness, as well as the questions related to energy and energy efficiency – two fundamental factors in the region of Baden-Württemberg which is one of the most industrialised regions in the EU.

*Dominique Ristori, Director General of the JRC, and Franz Untersteller, Minister for the environment, climate and energy management of Baden-Württemberg after signing the letter of intent.*

## First Lush science prize for non-animal safety testing

A JRC team today receives the first Lush Science Prize for their pioneering work on non-animal chemical safety testing at an awards ceremony in London.

The new annual Lush Science Prize, a joint project between the global handmade cosmetics company and Ethical Consumer magazine, is designed to bring forward the date when ingredients for cosmetics and household products are no longer tested on animals.

The Systems Toxicology Unit and the European Union Reference Laboratory for Alternatives to Animal Testing (EURL ECVAM) designed and demonstrated a high-throughput screening

system to categorise chemicals based on their potential to cause liver toxicity (see JRC newsletter November 2012). The jury found that this research produced some novel key results to solve the jigsaw puzzle that represents our understanding of the human reaction to chemicals and that the study of liver toxicology, a very important aspect in safety testing, is right in the centre of animal-free safety testing.

The prize money (£ 50.000) will be used to further work in the area.

*Brigitte Landesmann, Rob Harrison and Milena Mennecozzi on the occasion of the LUSH prize for non-animal chemical safety testing, awarded in London recently.*



## Award from the International Conference on Science in Society

JRC-IPSC's scientist Paula Curvelo da Silva Campos Alves has received the Graduate Scholar Award from the International Conference on Science in Society. Her research has the objective to develop an analytical framework that can contribute to a better understanding of the social and ethical issues raised by geoengineering proposals, and that can be used as the basis for further analysis with a view to developing and implementing appropriate governance mechanisms to steer both geoengineering research and deployment.

Graduate Scholar Awards are given to outstanding graduate students who have an active academic interest in the conference area. Graduate Scholars perform a critical role in the conference by chairing the parallel sessions, providing technical assistance in the sessions, participating in Talking Circles, and presenting their own research papers. The Award with its accompanying responsibilities provides a strong professional development opportunity for graduate students at this stage in their academic careers.

Read more:  
[http://ihcp.jrc.ec.europa.eu/our\\_activities/alt-animal-testing/lush-science-prize-jrc-ihcp-scientists-award-ceremony-in-london](http://ihcp.jrc.ec.europa.eu/our_activities/alt-animal-testing/lush-science-prize-jrc-ihcp-scientists-award-ceremony-in-london)

Read more:  
<http://science-society.com/the-conference/graduate-scholar-awards>

## BT Young Scientist & Technology Exhibition



The 49th edition of the BT Young Scientist & Technology Exhibition took place in Dublin, Ireland, from 10 to 12 January. It was once again an unforgettable experience for more than 500 second level students from all over Ireland who participated in the competition. The exhibition displayed the work of the participating students but it also hosted exhibitions from other partners.

The JRC, together with the European Commission Representation in Ireland and with the European Parliament Information Office in Ireland, shared the European Union stand. The stand focused on biodiversity and maritime affairs and interactive activities aimed at promoting sustainable fishing.

The event attracted over 40,000 visitors making it one of the largest events of its kind in Europe.

*Commissioner Geoghegan-Quinn, Pat Lambert of the JRC and budding scientists playing the eco-ocean game at the JRC's stand at the recent BT Young Scientist & Technology Exhibition.*

## European Network of GMO labs celebrates its 10th anniversary

Read more:  
<http://gmo-crl.jrc.ec.europa.eu/ENGL/default.html>

At a meeting on emerging issues related to GMO analysis held at the JRC Ispra site, the European Network of GMO Laboratories (ENGL) marked its 10th Anniversary. The event, held from 3 to 5 December 2012, included a celebration ceremony with awards to ENGL members who had supported the initiation of the network back in 1999 and provided important contributions to its excellence.

The network of GMO laboratories was created to improve the capacity of the EU to detect and

screen GMOs, as well as to provide a sound scientific basis for enforcing biotechnology legislation. It consists of more than 100 national enforcement laboratories representing all 27 EU Member States, as well as Norway and Switzerland. ENGL's mandate, as defined by Regulation 1829/2003, is to assist the JRC-hosted EU Reference Laboratory for GM Food and Feed (EURL GMFF), the body responsible for the scientific assessment and validation of GMO detection methods for food, animal feed or seeds in the EU's authorisation process.



## *Inauguration of the new JRC-ITU office building*

The JRC's Institute for Transuranium Elements (ITU) is engaged in large renovation and upgrade of its infrastructure. The former administrative building was built in the early 1960s and presented deficiencies in terms of energy saving, ergonomics, as well as high maintenance costs. Moreover, to comply with the requirements of the licensing authorities, of having all office places outside the controlled area, it was necessary to relocate technical and scientific staff. Following an architecture contest, the Institute's office

area has been extended and restructured by means of a northern structural element and a southern structural element. It has been chosen to bring all staff into the new building in order to support the institute identity and the internal communication.

On 4 February 2013, the new building will be inaugurated with the participation of European Commissioners Máire Geoghegan-Quinn and Günther Öttinger.

## *Scientific support to EU growth and jobs: Efficient buildings, vehicles and equipment*

On 26th March the JRC will be organising a major conference with about 500 expected participants. High level speakers from science and industry will discuss the main sectors concerned: efficient buildings, vehicles and equipment.. The main aim of this event is to identify where scientific support is needed to strengthen Europe's Eco-Industries as a source of growth and jobs.

Europe faces unprecedented challenges, and the need to return to economic growth and job creation is critical to recovery from the current

crisis. European efficient buildings, vehicles and equipment are three key sectors that present a real opportunity to boost Europe's competitiveness and contribute to economic development while promoting long-term sustainability at the same time. They have the potential to trigger investment and innovation, leading to economic growth and jobs. However, on the way to shifting to a more efficient approach, there is still a need for additional scientific support from the public as well as the private sector.

## *JRC participates at the AAAS annual meeting*

This year again, the JRC will be well represented at the most widely recognised global science gathering: the annual meeting of the American Association for the Advancement of Science (AAAS), to be held in Boston 14- 18 February under the theme "the beauty and benefits of science". JRC scientists will participate in 4 sessions, covering topics related to security

research, healthy living, actinides and scientific advice.

The AAAS event brings together a diverse array of leading scientists, engineers, educators, and policy-makers from over 50 countries gathering thousands of participants.

## *Symposium on "Nuclear Fission Research for a Low Carbon Economy"*

On 26 and 27 of February, the European Commission and the European Economic and Social Committee (EESC) organise in Brussels a symposium about nuclear fission research and its role towards a low carbon energy mix.

The event will provide the opportunity for an open, balanced and exploratory process of

dialogue and debate for all stakeholders in civil society.

During the symposium, a study on the "benefits and limitations of nuclear fission research for a low carbon economy" will be presented.

Link:  
<http://www.eesc.europa.eu/?i=portal.en.events-and-activities-symposium-on-nuclear-fission>

Jobs at the JRC:  
<http://www.jrc.ec.europa.eu/jobs>

## Post-doc researchers: Auxiliary contract staff

(function group IV)



Do you have a PhD in science and want to see how your work can influence policy? The Commission is drawing up a database of 3 000 profiles from the following disciplines: **natural sciences, quantitative sciences, human and social sciences, agricultural, environmental and earth sciences or health sciences.**

Closing date: 1 March 2013  
<http://www.jrc.ec.europa.eu/jobs>

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.

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