

JRC newsletter



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Finding the right balance with the world's largest research scheme



Amalia Sartori, MEP, Chair of ITRE Committee

“We not only need excellent fundamental science, but also applied research to tackle the great global challenges”

Upon my election as Chairwoman for the Industry, Research and Energy (ITRE) Committee for the 2nd term of the European Parliament (EP) legislation period, it appeared clear to me that research would play a central role for the period of my mandate - more specifically the discussions on the 8th European Research Framework Programme; Horizon 2020, the largest research scheme in the world.

Now, after the vote in the ITRE Committee in November 2012 (which constitutes the mandate for the negotiations with the Council) we are in the middle of intensive trilogues (meetings between the Parliament, the Council and the Commission) that will hopefully successfully be concluded by middle of 2013.

Do we have the right balance between fundamental and applied research? This has been one of the most challenging and controversial questions since we have Research Framework Programmes in the EU. In the beginning of our common research policy, the focus was clearly on the competitiveness of European industries and other fields of applied research (mainly the areas called “grand challenges” today). This has changed remarkably, the main breakthrough for fundamental research being the foundation of the European Research Council (ERC) in 2007. The EP has always supported the ERC and its unquestionable success has encouraged our support.

A great majority of ITRE Members agrees that the ERC is an investment into Europe's future that will pay off. But of course we do not only need excellent fundamental science, we also need applied research to tackle the great global challenges, and we have to transform scientific results into products and services. We need an appropriate environment as well as adequate funding tools. In many cases there seems to be a lack of venture capital that prevents scientific results and good ideas to become a market success. I hope we can contribute to solving this problem with the financial instruments of Horizon 2020 and with its new measures tailored for SMEs. It is also important that we find the right funding scheme for collaborative projects: attractive to industry and thus generating a leverage effect, respecting competition law, but at the same time operating as simply as possible.

Do we use our human resources in a sensible and sustainable way? This is in my opinion the

most urgent question European research policy has to tackle: in the end everything depends on people and the best brains. My colleagues in the ITRE Committee are aware that scientific talent is the most important resource of Europe. We also know, however, that there is sharp international competition for those outstanding brains. But Horizon 2020 can and will make a contribution to stop the brain drain out of Europe. It offers different schemes to attract talented scientists to Europe: the ERC for top scientists, the “Marie Skłodowska-Curie-Programme” for highly promising young researchers, and the European Institute for Innovation and Technology offers top quality academic education in key technologies and scientific challenges.

How can we better link Horizon 2020 and the Structural Funds? Research and innovation funding is one of the major tasks of the Structural Funds. Therefore, in principle, it is not difficult to combine money of the Structural Funds with money of the Research Framework Programme. Nevertheless, this happens too rarely. Either the regions in charge of the Structural Funds define other priorities than research, or they indeed build research infrastructures but without any link to European research programmes or networks. It is common sense that synergies between these two European programmes should have been improved since many years, but not much progress has been made. We propose that “downstream” from Horizon 2020, the Structural Funds could be used to finance the follow-up of the projects, the transformation of the results into innovation. “Upstream”, the Structural Funds can act in many different ways as “stairways to excellence”.

Without entering into the details of the negotiations (as you know nothing is agreed before everything is agreed), let me say that the Parliament has strongly supported the role of the JRC within Horizon 2020. It may be of particular interest for the JRC's Institute for Prospective Technological Studies in Sevilla (which I had the opportunity to visit last February) that we would like to see the JRC increase support to national and regional authorities in the development of their smart specialisation strategies.

Amalia Sartori,
Member of Parliament,
chairwoman of the Industry, Research and Energy
(ITRE) Committee

Round tables on the Single Market and quantum technologies

The potential of the single market

A round table on “Scientific support to the Internal Market” took place on 21 February in Brussels at the initiative of Commissioner Barnier and with the support of Commissioner Geoghegan-Quinn.

The opening session underlined that science plays an important role in providing support to the strengthening of the Single Market. OECD’s Deputy Secretary-General, former Belgian Prime Minister Yves Leterme, highlighted the importance of Knowledge-Based Capital and declared that science can be used not only to create the foundation of a sustainable long-term growth but also to strengthen the current recovery.

Different needs for scientific expertise were discussed, including expertise in the analysis of market functioning. Speakers acknowledged that services markets are notoriously difficult to study and that the improvement of data collection and setting-up of databases is a pre-requisite to solid scientific analysis.

The main economic effects of the Services Directive were presented as well as some examples of services (building services, advanced manufacturing, ...) where standards could be developed. It was also stressed that the full implementation of this Directive required more



in-depth analysis on the evaluation and monitoring of the barriers to the services market.

During the intellectual property session, the necessity to have the right mix of legal tools was underlined. Regarding e-commerce, the JRC’s Director-General affirmed that more analysis is a pre-condition to understanding what hinders online transactions. The consensus was that more science is needed to define tools and indicators to measure the performance of e-procurement and its impacts.

The meeting was organised by the JRC and jointly opened by Commissioner Barnier, OECD Deputy Secretary-General Yves Leterme and the European Parliament’s Science and Technology Options Assessment Panel (STOA) Chairman António Correia de Campos.

At the recent roundtable on scientific support to the Single Market, from left: Michel Barnier, European Commissioner for Internal Market and Services; Dominique Ristori, JRC Director General; Yves Leterme, OECD Deputy Secretary-General; and Antonio Correia de Campos, European Parliament Science and Technology Options Assessment (STOA) Committee chairman.

Quantum technologies: new applications

The JRC hosted a round table on 7 March on the potential applications of quantum science and the development of new technologies in the areas of computation, simulation, communication, metrology and sensing. It also focused on the challenges these new technologies may bring to the European policy-making landscape.

The event included the participation of 2012 Nobel Prize winner in Physics, Serge Haroche, for his work on quantum systems. The JRC and DG Enterprise Directors-General and the JRC Deputy Director-General, along with several representatives from research and industry also took part.

JRC Director-General Dominique Ristori stressed the potential of the new quantum developments

to boost growth and jobs in the EU. He highlighted the leading role of European research in this area and called for a transformation of this knowledge into concrete market applications and underlined the importance of standards and international collaboration in this process.



JRC Director General Dominique Ristori and Serge Haroche, 2012 Nobel Prize winner at the recent roundtable event on quantum technology.

Measuring global pollution and resource use footprint

Read more:

JRC Report: Global Resources Use and Pollution, Volume 1 / Production, Consumption and Trade (1995-2008):

<http://publications.jrc.ec.europa.eu/repository/handle/111111111/27628>

In recent decades, the increase of the world's population, economic expansion and globalisation of the economy have led to a dramatic growth in the use of some natural resources and the levels of pollution. These trends have coincided with growing concerns about critical issues such as resource scarcity or depletion, climate change, environmental degradation, the limits of growth and the inequalities with respect to access to natural resources across countries.

In this context, the JRC has published a comprehensive dataset of reliable and comparable economic and environmental information. The goal is to contribute to a better understanding of the complexity of these issues and to support evidence-based policy making.

These data present a series of indicators describing the evolution, between 1995 and 2008, of the use of natural resources and the emission of air pollutants around the world in relation to production, consumption and trade activities. The 'production' indicators report on the use of resources as primary inputs (i.e. domestic extraction of materials or cultivated land) and the emissions directly generated by national economic activities for each country. The 'consumption' or 'footprint' indicators show the resources or pollution embedded in the domestic final demand of a country, regardless of where these resources/emissions were used/emitted. Finally, the 'trade' indicators show the volume of resources and pollution embedded in international trade.

Results

The data clearly show a steadily increasing trend in the global use of resources and the emission of pollutants, in many cases well above the world population. However, we can observe a wide variation across countries in the contribution to this trend. Whereas industrialised countries have managed to stabilise and/or reduce the use of resources and the emissions generated in the limits of their boundaries, emerging economies are increasing their domestic environmental impacts (see chart I).

To some extent, the evolution in the environmental impact of countries is related to the globalisation process. It is widely known that an increase in international trade affects

Chart I

Domestic resource extraction/use & emissions and exports - % change 1995-2008.

	Land	Materials	Water	GHG
EU-27	-0,9%	11,1%	14,9%	-3,3%
BR	10,6%	54,0%	59,0%	35,0%
CN	-2,4%	129,4%	53,1%	86,1%
IN	0,6%	62,2%	29,2%	52,4%
JP	-2,5%	-28,4%	-6,8%	1,1%
RU	31,9%	30,0%	45,8%	4,7%
US	-11,8%	-5,0%	17,3%	7,0%
RW	0,7%	40,2%	41,2%	39,5%
World	1,8%	43,3%	37,3%	29,1%
World Exports	21,0%	80,0%	88,2%	83,2%

both where and by whom resources will be used, and pollutants will be emitted. Now, for the first time, we can compute the environmental impacts of trade: between 1995 and 2008 the land, materials and water embedded in international trade grew by 21%, 80% and 88% respectively, while the emissions of acid substances, greenhouse gas (GHG) and ozone precursors increased by 54%, 83% and 103% correspondingly.

One of the consequences of displacement of environmental impacts is that countries can benefit from consuming goods without suffering the environmental costs of their production. In this sense, footprint indicators measure the global environmental impacts linked to the consumption patterns of a country. According to this approach, we can observe that most countries in the world have increased their environmental impacts. This trend is especially

Chart II

Footprint of resource extraction/use & emissions - % change 1995-2008.

	Land	Materials	Water	GHG
EU-27	4,4%	25,1%	34,4%	10,5%
BR	-4,4%	33,7%	40,5%	30,1%
CN	6,8%	133,3%	46,3%	63,9%
IN	5,4%	62,2%	28,1%	56,4%
JP	-37,4%	-4,7%	-12,2%	-4,8%
RU	40,9%	31,4%	62,2%	5,0%
US	-8,5%	12,2%	25,8%	17,0%
RW	1,2%	34,6%	42,7%	42,2%
World	1,8%	43,3%	37,3%	29,1%

to the global environmental footprint is well below their share of world population for most environmental dimensions.

These indicators have recently been published by the JRC and presented in two volumes. The first one provides indicators for each category or resource (land, materials and water) and type of emissions (acid substances, greenhouse gases and ozone precursors) and the second provides

a set of data by country, including the EU-27 countries, the US, Japan, Brazil, Russia, India, China and the rest of the world as an aggregated region.

The publications use data derived from the JRC-managed World Input-Output Database (WIOD), a European Commission funded FP7 project.

NEWS

Bioeconomy observatory to map progress towards a post-petroleum society

Read more:

Life Cycle Thinking

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

A JRC coordinated Bioeconomy Observatory will monitor progress of the sustainable conversion of biological material and waste – from agriculture, forestry and livestock farming – into raw material and industrial products, including energy. Operational as of March 2013, it will follow the evolution of markets and map regional, national and EU policies, research and innovation capacities, as well as the scale of related public and private investments. The Observatory aims to make this data publicly available through a dedicated web portal in 2014.

The bioeconomy is currently estimated to be worth EUR 2 trillion and to account for 22 million jobs in the EU. It has the potential to add one full-time-equivalent job for every EUR 35 000 invested in research and innovation by 2020. Through the coordination of this observatory, the JRC will help map progress and measure the impact of the European Commission's bioeconomy strategy, launched in February 2012. It is one of the operational proposals under the Innovation Union and Resource-efficient Europe flagships of the Europe 2020 strategy on growth.

EU forests carbon stock equivalent to 9 years of CO₂ emissions

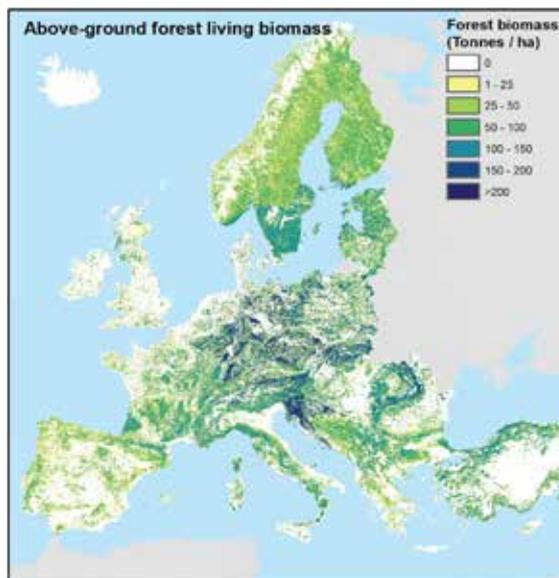
Read more:

A European map of living forest biomass and carbon stock - Executive report, 2012, JRC Scientific and Technical Research Report – doi: 10.2788/780

<http://publications.jrc.ec.europa.eu/repository/handle/111111111/27248>

The total carbon stock in European forests amounts to nearly 9900 million tonnes according to a JRC report. This is equivalent to the total

amount of CO₂ emitted by the whole of the EU over roughly nine years.



From 2005 to 2010, forests in the EU captured approximately 430 million tonnes of CO₂, equivalent to 10% of total greenhouse gas emissions for that period.

Forests act as carbon sinks and 50% of forest biomass is made up of carbon. Over the period 2005-2010, forests in EU countries were found to sequester approximately another 430 million tonnes of CO₂ each year, equivalent to around 10% of total greenhouse gas emissions during this period. Forests also play an important role in providing biomass for energy production, accounting for more than 50% of the EU's renewable energy resources.

This study is the first harmonised and comparable dataset for European-wide maps of forest biomass and carbon. These are essential variables for assessing biomass availability at the EU level, evaluate its sustainability and quantify the terrestrial potential for carbon storage and carbon sinks. Furthermore, this information serves to estimate potential emissions from deforestation, fragmentation and forest degradation. It is valuable input for assessing, designing and implementing effective sustainable forest management options and forest-related policies at EU level.

EU's poorly connected forests hinder biodiversity

In a recently published report, the JRC shows that 70% of the European territory has poorly connected woodlands, and that 40% of these woodlands are within 100 metres of non-forest, predominantly intensively used, land areas.

This increases the likelihood that forests, notably at their edges, might be exposed to invasive species and diseases. Furthermore, forest fragmentation makes it more difficult for forest-dwelling animals and plants to migrate or disperse their seeds, thereby hindering biodiversity. It also has a negative impact on the forests' ability to provide habitats or other ecosystem services such as pollination and climate regulation. To address this, the mitigation of ecosystem fragmentation has been incorporated as a key target of the European Biodiversity Strategy of 2020.

The JRC report demonstrates the usefulness of a set of reproducible indices established by the JRC for assessing and monitoring forest landscape patterns. These indices provide a toolbox that could also be applied to help

assessing fragmentation and connectivity of other ecosystems. The results of this report were used in the Forest Europe, UNECE and FAO joint ministerial reporting process on the protection of forests in Europe.



Increasing fragmentation of European forests hinders biodiversity.

Fishing drives the loss of shark and ray populations in the Adriatic Sea

The shark and ray communities in the Adriatic Sea have been highly depleted in recent years, with fishing being a key driver of the decline. A JRC co-authored article published in Nature Scientific Reports combined and standardised catch data from five trawl surveys conducted between 1948 and 2005 to evaluate long-term trends in the Adriatic Sea populations of elasmobranchs, a subclass of cartilaginous fish which counts 33 different species (12 shark species, 20 rays and one chimaera). Since 1948, catch rates of these populations have declined by 94% and 11 species have ceased to be detected.

The number of these species can decrease considerably with fishing, but assessing the drivers of community changes can be complicated due to interactions between species and variations in vulnerability and exposure to fishing.

An observational approach across gradients of natural or human-induced changes is an efficient alternative. The Adriatic Sea offered an ideal case study thanks to its long history of human-induced changes and the differences between the Italian coast, exposed to extremely high exploitation pressure and the Croatian coast, with a much lighter fishing exploitation, resulting in a greater

abundance and diversity of elasmobranchs. Results show that the exploitation history and changes in fishing pressures could explain most of the observed patterns of abundance and diversity, including the absence of strong compensatory increases.

The study highlights the importance of historical data for understanding long-term dynamics of marine species and suggests that careful planning and international management of developing fisheries in the Adriatic and the creation of ecological corridors and large-scale protected areas could help to promote recovery of shark and ray communities.



Fishing practices have a detrimental effect on shark and ray populations.

Read more:

Forest Landscape in Europe: Pattern, Fragmentation and Connectivity, 2012, JRC Scientific and Policy Report – doi: 10.2788/77842

<http://publications.jrc.ec.europa.eu/repository/handle/11111111/27726>

Read more:

Scientific Reports: <http://www.nature.com/srep/2013/130110/srep01057/full/srep01057.html>

Scientific support to Fisheries: <https://fishreg.jrc.ec.europa.eu/>

Read more:

Marine Ecology
Progress Series
464:289-306

<http://www.int-res.com/abstracts/meps/v464/p289-306/>

Habitat mapping of key marine species at JRC - publications and maps:

<https://fishreg.jrc.ec.europa.eu/fish-habitat>

Mapping of potential risk of ship strike with fin whales in the Western Mediterranean Sea

<http://publications.jrc.ec.europa.eu/repository/handle/11111111/27790>

Read more:

Safety of offshore oil and gas operations: Lessons from past accident analysis: Ensuring EU hydrocarbon supply through better control of major hazards:

<http://publications.jrc.ec.europa.eu/repository/handle/11111111/27463>

Mapping the risk of ship strike with endangered whales

Among the numerous threats for large cetaceans, ship strike and noise pollution are likely to be the highest. While the Mediterranean Sea is a major forage ground for the endangered fin whale, it also represents 30% of all international maritime traffic concentrated within only 0.8% of the global ocean surface. In order to investigate the impact of maritime corridors in the open sea, the JRC has merged data on daily traffic with information on which habitats are favourable to fin whales to produce maps of potential risk of strike. The potential habitat model, which is also developed at the JRC, uses daily satellite environmental data and thus captures the high variability at large scale.

The results show that the Liguro-Provençal Basin, and particularly the area of the Marine Mammal Pelagos Sanctuary, has a high potential collision risk in mid-summer due to high passenger traffic.

The proposed method of combining potential habitat and maritime traffic data provides an added value for policy-makers. Besides mapping the potential risk of ship strike, the JRC's work highlights the feasibility of future operational mitigation systems. For instance, the daily product of potential habitats could be used in a near real-time system on board of large vessels

to increase awareness of the risk of collisions. They can also be used as complementary data to develop real-time plotting systems of cetaceans. Researchers also propose to install moored acoustic buoys along vessel corridors that transmit information about the whales' position to the vessels in real-time, allowing them to adapt their speed when passing prime habitats. Further research is needed to investigate whether traffic noise induces an effective loss of habitat for fin whales.



Ship strike is a high threat for endangered whales.

Review of oil and gas offshore accidents

On 21 February the European Parliament and the Council reached a political agreement following a 2011 European Commission proposal on new legislation for the safety of offshore oil and gas prospection, exploration and production activities. They are expected to formally approve the legislation in the coming months.

A new JRC report reviews current sources of information on accidents and their availability to operators, authorities and the public. The report "Safety of offshore oil and gas operations: Lessons from past accident analysis" analyses some of the accidents that have had the highest impact and examines the lessons learned for the industry and the regulatory authorities, linking them to the phases of the risk management chain: prevention, mitigation, emergency preparedness, response and recovery.

The conclusions highlight the lack of harmonised reporting on accidents across the EU, and the poor access to information for researchers, consultants and the public. The report recommends a common format for reporting on accidents. Such an approach would allow pooling of experience and exchange of non-confidential

information, eventually contributing to safer oil and gas extraction.

The statistical analysis also reveals that offshore accidents with severe and long-lasting consequences are not extremely rare events as initially thought, at least concerning failures, causes and chain of events.



There is a lack of harmonised reporting on accidents on offshore oil and gas rigs across the EU.

Development of new car emission test procedure

On-road emissions testing with portable emissions measurement systems (PEMS) is judged to be a better method to cover the wide range of driving and ambient conditions than random laboratory test cycles according to a newly published JRC report. In 2012 it was decided to primarily develop on-road testing with PEMS as the main real-driving test procedure.

In Europe a laboratory test procedure based on a predefined driving cycle is used to check whether passenger car emissions comply with the regulatory standards. However JRC research suggested that this laboratory test does not accurately capture the amount of nitrogen oxides emitted by diesel cars on the road, which is in fact substantially higher. In 2010 the Commission

decided to complement the current laboratory test with a real-driving test procedure on the road.

A JRC-led working group composed of industry stakeholders and Member States representatives was established to assess the potential of two candidate procedures: emissions testing with random driving cycles in the laboratory, and on-road emissions testing with portable emissions measurement systems. The group decided to primarily develop the PEMS-based testing technology and an extensive test campaign will be conducted in 2013 in cooperation with car manufacturers and European technical services.

New pollution prevention and control requirements for tanneries

A new implementing decision establishing the best available techniques (BAT) conclusions on industrial emissions for the tanning of hides and skins was recently adopted by the European Commission. These conclusions define the reference for setting the permit conditions for tannery installations in Europe under the Industrial Emissions Directive (IED) 2010/75/EU. The IED currently regulates emissions to air, water and soil of about 50,000 industrial installations across the EU. With the goal to improve the environmental performance of tanneries, these

BAT conclusions cover, among other topics, the implementation of environmental management systems; the appliance of good housekeeping principles, such as the selection and control of substances and raw materials; the consumption of water; the monitoring and management of emissions to water (in particular organic matter, suspended solids, ammonia, chromium and sulphide) and to air (in particular volatile organic compounds) and aspects such as odour, waste and energy.

Reduced meat consumption benefits environment and health

Greenhouse gas (GHG) emissions from the EU livestock sector could be mitigated by up to 60% (about 377 million tonnes of CO₂ equivalent) according to a recently published study co-authored by the JRC. The article also accounts for GHG emissions from the production and consumption of livestock products, reviews available mitigation options, and concludes that the EU's GHG emissions reduction target of 20% by 2020 is achievable.

Minimising food waste would have the greatest impact on reducing GHG emissions. By avoiding the production of wasted animal products, 39-79 million tonnes of CO₂ equivalent emissions could be mitigated. In addition, considering that livestock account for 80% of anthropogenic land use and consume 35% of agricultural crops, land management practices should be optimised, intensive grain-fed production avoided and

support provided to help avoid clearing forests for livestock grazing.

Consumption of animal products should also be reduced as this would conform to healthier eating guidelines. Protein intake in the EU is 70% higher than the levels recommended by the WHO.



Read more:

A complementary emissions test for light-duty vehicles: Assessing the technical feasibility of candidate procedures:

<http://publications.jrc.ec.europa.eu/repository/handle/11111111/27598>

Read more:

Commission implementing decision:

<http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2013:045:001:3:0029:EN:PDF>

EIPPCB:

<http://eippcb.jrc.es/>

Read more:

Commission implementing decision: [Livestock greenhouse gas emissions and mitigation potential in Europe, 2013, Global Change Biology 19 \(1\), 3-18, http://onlinelibrary.wiley.com/doi/10.1111/j.1365-2486.2012.02786x/abstract](http://onlinelibrary.wiley.com/doi/10.1111/j.1365-2486.2012.02786x/abstract)

Pedestrian dummies efficient for testing emergency brakes

Read more:

Radar Cross Section Measurements of Pedestrian Dummies and Humans in the 24/77 GHz Frequency Bands

<http://publications.jrc.ec.europa.eu/repository/11111111/27421>

The JRC has conducted a series of measurements to check the efficiency of pedestrian dummies when testing new autonomous emergency braking (AEB) systems. These dummies are used to mimic pedestrians for the AEB sensors. As they are increasingly being used, there was a need for harmonised test and evaluation procedures and standards. The results show how visible dummies are to the braking devices.

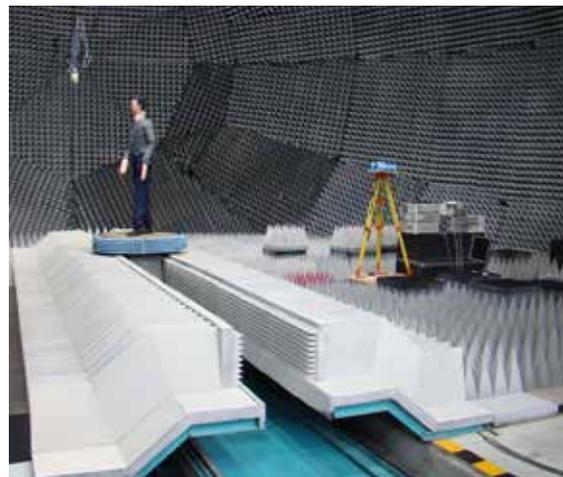
Simultaneously, radar cross section (RCS) measurements have been collected in two main frequency bands (23–28 GHz and 76–81 GHz). There were no significant differences but in the higher frequency bands, the height of the pedestrian has a clearer effect on the RCS averages observed.

Furthermore, a first qualitative comparison of the RCS signatures between dummies and humans was completed and shows that the RCS averages of the dummies are slightly below those of the humans. The researchers also designed a set of measurements to assess the impact of clothing and it was found that in most cases clothing did not significantly impact the RCS signatures observed.

These measurements have been performed in the JRC's European Microwave Signature

Laboratory (EMSL), which is used to test and validate legislative proposals on new wireless communications standards and satellite navigation services.

Two very important functions of AEB sensors are to detect fixed and mobile obstacles (e.g. pedestrians). Radar sensors have the advantage of being immune to weather conditions (unlike video cameras, for instance).



The measurements have been performed in the JRC's European Microwave Signature Laboratory, located in Ispra (Italy).

20 years protecting human health from chemicals... and counting

REACH Review:

http://ec.europa.eu/enterprise/sectors/chemicals/documents/reach/review2012/index_en

EURL ECVAM:

http://ihcp.jrc.ec.europa.eu/our_labs/eurl-ecvam

The use of chemicals in Europe has become considerably safer according to the "Review of REACH" adopted by the European Commission on 5 February 2013. The JRC played a fundamental role in the formulation of REACH (Regulation on registration, evaluation, authorisation and restriction of chemicals), by hosting the European Chemicals Bureau from 1993 to 2008, and has since continued its active support to the EU policy on chemicals. REACH streamlines and improves the former legislative EU framework on chemicals, aiming to ensure a high level of protection of human health and the environment from the risks of chemicals, to promote alternative test methods and the free circulation of substances on the internal market, enhancing competitiveness and innovation.

Five years after the implementation of REACH in 2007, the review takes stock and makes recommendations for further improvement, including enhancing the quality of registration dossiers submitted by the industry and the use of safety data sheets as a central risk management tool. The staff working document accompanying

the REACH Review particularly acknowledges the efforts made in the EU to develop alternative methods to animal testing (approx. EUR 330 million were spent since 2007 to fund direct and indirect research in this area) and the pivotal role of the JRC-hosted European Union Reference Laboratory for Alternatives to Animal Testing (EURL ECVAM) in coordinating validation, but also in promoting the development of alternative methods for hazard assessment, both *in-vitro* and *in-silico*.

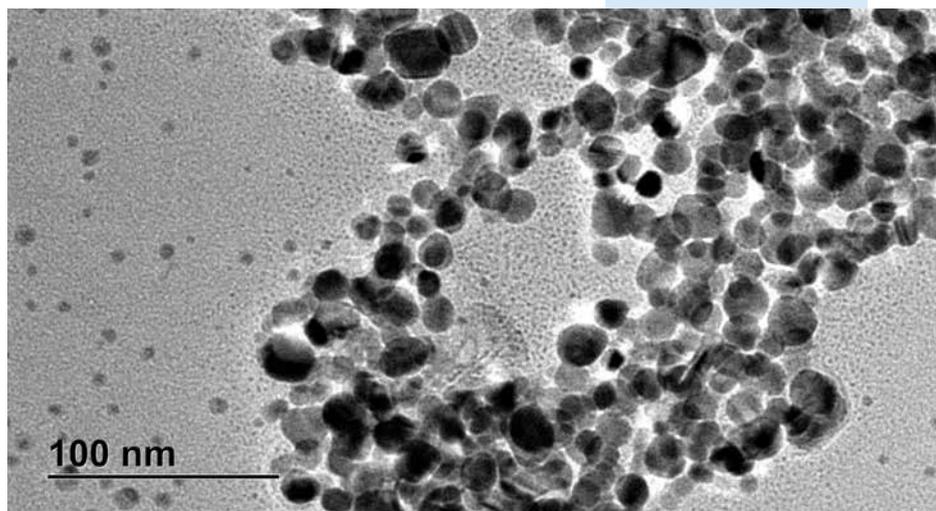


Radiolabelling nanoparticles at JRC's cyclotron allows detection and tracing

JRC scientists managed to synthesise silver nanoparticles, labelled with ^{105}Ag , an easily-detectable gamma-emitter with a 41-day half-life, the production of which requires a medium energy cyclotron like the JRC's MC40. The new samples will help research to address growing safety concerns related to the increasing use of silver nanoparticles in consumer products, such as anti-odour sportswear, socks or underwear, as an antimicrobial component.

In small amounts, nanoparticles can be enormously difficult to detect and quantify in real or test environments – e.g. in tissue or plant samples, consumer products (including foods and cosmetics), paints, soils, etc. – and so labelling methods can offer unique solutions for detecting and tracing the nanoparticles' movement. The JRC works on methods for detection and characterisation of nanoparticles, and determination of their hazard using *in-vitro* methods. Both direct and indirect methods have been developed for nanoparticle radiolabelling at the MC40 cyclotron at the JRC's Ispra site, which is a nuclear facility capable of producing energetic beams of light ions that can be used to create radioisotopes. This is the most sensitive and quantitative nanoparticle labelling option available.

The Radiotracers Group at the JRC cyclotron now collaborates with several research groups



Transmission Electron Microscope (TEM) images of silver nanoparticles radiolabelled with ^{105}Ag .

interested in applying radiolabelled nanoparticles for *in-vitro* or *in-vivo* work, and also for environmental tracing purposes. Cellular uptake of nanoparticles has been studied at the JRC for several years. Recently, novel studies concerning biological barriers crossing by nanoparticles that involve *in-vitro* gastrointestinal barrier models have been started. This is important to address safety concerns of nanoparticles in food. The use of radiolabelled nanoparticles is proving highly advantageous for these studies in terms of sensitivity and also offers excellent opportunities for resolving issues related to nanoparticle dosimetry.

New approach to measure the full isotopic composition of uranium samples

Gaseous uranium hexafluoride (UF_6) is one of the primary forms of uranium in the nuclear fuel cycle and it is important in order to monitor the isotopes during the enrichment process. The JRC has recently developed and validated in-house, a new method for the accurate isotopic measurement of UF_6 that allows measuring not only the major isotopes but also the minor isotope ratios ("U-minors"). Requests for reference measurements of "U-minors" have increased as they give an indication to safeguard authorities on the type of "feed" materials or of the enrichment process. Accurate measurements of the major and minor isotope ratios are therefore of utmost importance to draw correct safeguards conclusions on operator's declarations.

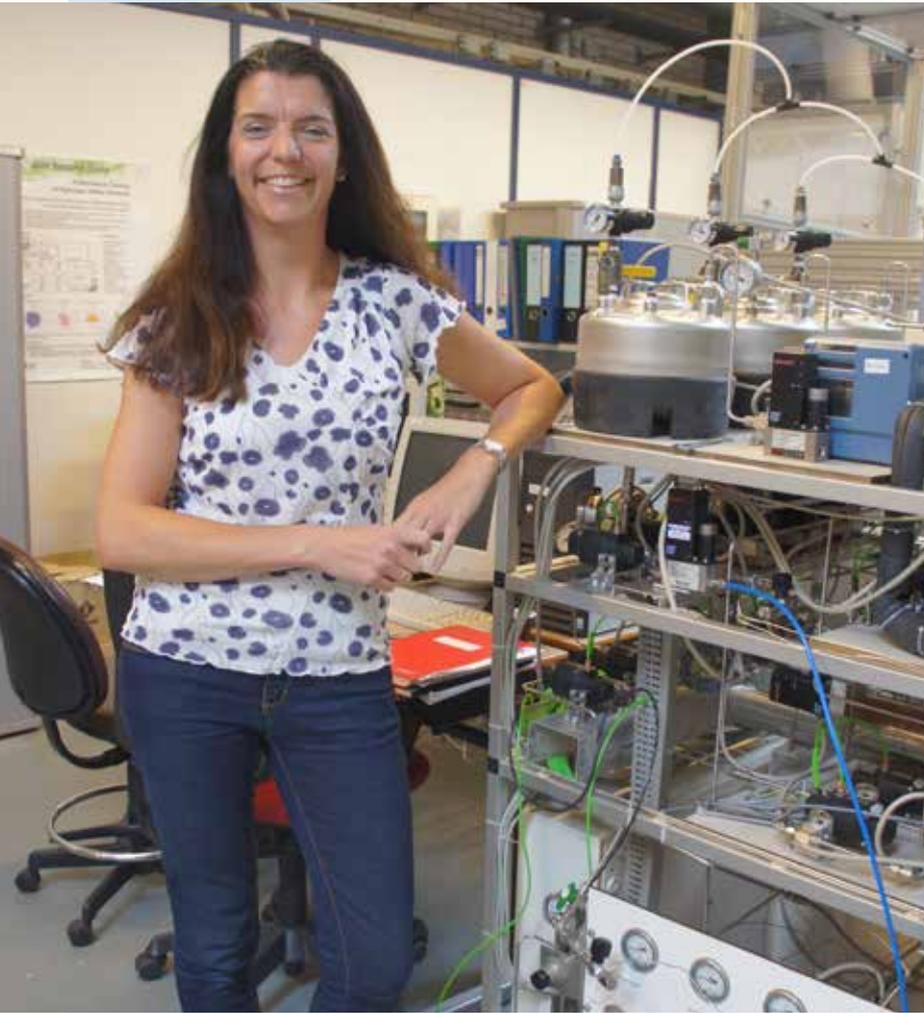
The new JRC method fulfils these requests. Its relevance has led to the recent invitation of the JRC by the standardisation body ASTM International (American Society for Testing and Materials) to revise the existing uranium measurement standards and to develop a new

standard based on the new methodology. The minor isotope ratio capability of this new method is also important to facilitate the preparation of tailor-made uranium mixtures as reference samples. For better safeguard measurements, a larger variety of isotopic reference materials certified with high accuracy may become necessary for which the JRC is well prepared to produce upon request.



The JRC has recently developed and validated in-house an innovative new method to accurately measure uranium isotopes.

Working on different technologies for Europe's future



JRC scientist Lois Brett, who pioneered the JRC's Hydrogen Sensor Testing facility, SenTeF.

Four days a week, Lois Brett hops on a ferry from the Dutch island of Texel to get to the mainland, where she travels further south to the Institute for Energy and Transport in Petten. Although the 100 km return journey takes her about 2.5 hours per day, it is with much pleasure and satisfaction that she goes to her office as she feels privileged to work for the JRC.

"I have always had a curious nature, constantly asking myself questions and looking for the answers," says Brett. "At school, science and mathematics were the subjects which most often helped me solve these puzzles. I changed my mind quite a lot about what I wanted to become – depending on what sparked my imagination, it varied from marine biologist, tree surgeon to rocket scientist. Eventually, I ended up doing a PhD in physical chemistry, where my affair with hydrogen began."

SenTeF, the JRC's Hydrogen Sensor Testing facility, was Lois Brett's brainchild. "I initially worked in the hydrogen bunker on the Compressed Hydrogen Gas Tanks Testing Facility (GasTeF), and later I came up with the idea for research

on hydrogen sensor testing. After a three-year break from the JRC, when I worked for the Dutch national research organisation TNO to develop a solid hydrogen storage material, I took up leadership of SenTeF."

Lois Brett describes herself as a forward-looking person which is why, since January 2013, she also heads a brand new project called BESTEST, which stands for Battery Energy Storage Testing for Safe Electrification of Transport. "BESTEST is an opportunity for the JRC to profile its independence and scientific excellence in the rapidly expanding arena of safe energy storage for the electrification of transport," explains Brett. "It perfectly complements our other activities on fuel cells and hydrogen storage and safety of transport. More and more, hydrogen and batteries are seen as complementary so that Europe's future transport landscape will be a patchwork of different technologies, including battery electric, plug-in hybrid, hybrid electric, hydrogen (or fuel cell) and advanced fossil fuel combustion – each serving different market niches."

"It is crucial," continues Brett, "that the JRC supports the development and innovation of these complementary technologies – doing so highlights our impartiality to all feasible emerging technologies. It is quite novel that within one entity, in this case the Cleaner Energy Unit, hydrogen technologies, fuel cells and electric vehicle batteries will be independently tested and evaluated with the same critical eye."

For BESTEST the JRC is now building an experimental complex with facilities for performance evaluation of battery cells and full scale electric vehicle battery packs, and for abuse testing of battery cells. Many aspects of the Plant Simulation Testing Laboratories (PSTL) are being exploited to house these facilities and, where necessary, the building will be retrofitted and modernised. The experimental activities will be supplemented with microstructural analysis, diagnostic studies and more desktop oriented work, including establishing a battery safety information tool, in collaboration with European industry.

"While it is true that BESTEST's prime customers are the European Commission's policy DG's, we are also tailoring our facilities to the needs of the European battery industry," explains Brett, "and we are liaising with industry representatives to facilitate this. For the sustainability of the activity it is essential for us to be able to demonstrate not only our support to the battery industry, but also industry's need for our support."

"It is quite novel that within one entity, hydrogen technologies, fuel cells and electric vehicle batteries will be independently tested with the same critical eye"

New online tools to facilitate nuclear training and knowledge transfer

Two JRC-developed nuclear tools have recently been launched: the EHRO-N locator, which helps find nuclear training and facilities, and an online course on Water-Water Energy Reactors (WWER), aiming to preserve knowledge on this specific type of reactors.

The European Human Resources Observatory for the Nuclear Energy sector (EHRO-N) was set up at the initiative of the European Commission to address concerns about insufficient numbers of nuclear experts in Europe. The JRC has created an online tool for locating stakeholders and power plants, as well as training facilities, providers and databases across the EU. It provides a training database containing lists of courses, countries where they are given and links with more details and application information and a map with universities offering technical and engineering degrees. It also relies on a search function to find consultancies, design and manufacturing firms, fuel fabrication and enrichment facilities, as well as suppliers and vendors. It allows the mapping of nuclear power plants (operational, planned and under construction) located in the EU.

The second tool allows for online multimedia education on Water-Water Energy Reactor (WWER) pressure vessel embrittlement and has been developed in cooperation with the International Atomic Energy Agency (IAEA). It aims to reach junior nuclear engineers dealing with this issue, as WWERs are a series of pressurised water reactors still in use in several countries, both in Europe and elsewhere.

Knowledge on this type of reactors is at risk of being lost due to several factors such as the retirement of senior experts, the fact that older publications did not exist in digital format, and that many documents were not drafted in English.

The ten course modules (for example "Surveillance") provide very compact information and are powered with eye-catching animations to make the learning process simpler and more attractive. All modules include an icon to easily share and discuss with peers on social media like Facebook or Twitter.

Read more:

European Human Resources Observatory for the Nuclear Energy sector:
<http://ehron.jrc.ec.europa.eu/ehro-n-resources>

Water-Water Energy Reactors:
<http://test2.kz.archimed.bg/iaea/wwer/>

INNOVATION IN PRACTICE

The benefits of data preservation, access and dissemination for research

ODIN is the Online Data and Information Network hosted by the JRC. It includes engineering databases, document management systems and hydrogen storage databases for the European research community in the area of nuclear and conventional energy. The free online network stores data sets and documents and allows them to be accessed, exchanged and disseminated amongst the research community in a straightforward manner.

The European Commission recognises the significant contribution that effective data preservation and sharing practices can make to innovation and growth in Europe. In this context, ODIN now provides a data citation service whereby data sets are assigned a DOI (Digital Object Identifier) and published. This gives scientists the opportunity to use data sets of other researchers and cite them in much the same way as conventional scientific publications.

This innovative service benefits both the researchers who share their data, as the data

can be cited in derivative works, as well as others in the field as they can use data sets that can very often be expensive and time-consuming to produce. The ODIN data citation service will provide researchers with an incentive to publish their data sets, enriching the volume of work that is shared and reused within the research community, thereby helping to improve the research process and promote innovation.



In the areas of conventional and nuclear energy, the Online Data and Information Network hosted by the JRC provides information for the European research community.

Read more:

Online Data and Information Network:
<https://odin.jrc.ec.europa.eu/>

JRC & Tübitak establish the basis for scientific cooperation

The JRC has signed a Memorandum of Understanding (MoU) with the Scientific and Technological Research Council of Turkey (Tübitak), the country's national organisation tasked with research and development. With this agreement both organisations set the basis for cooperation in energy and clean transport,

environment and climate change, agriculture and food security, health and consumer protection, information society and cyber security, crisis and hazard management and safety and security.

The agreement provides for the promotion of information exchange and sharing, the possibility to host Turkish PhD and post-doc students at JRC Institutes, access to large infrastructures and a wide range of collaboration opportunities for training workshops, information events and conferences.

The MoU was announced on 28 February 2013, on the occasion of a "high level dialogue on scientific cooperation", held in Istanbul, which included the participation of the JRC's Deputy Director General, Vladimír Šucha and the Tübitak President, Yücel Altunbasak.



JRC's Deputy Director General, Vladimír Šucha and the Tübitak President, Yücel Altunbasak sign the Memorandum of Understanding.

EXTERNAL RECOGNITION

Greenshields Prize awarded at the Annual Transportation Research Board Meeting

For more information on the prize:

http://www.tft.pdx.edu/greenshields_prize.htm

Scientists from JRC's Institute for Energy and Transport (IET) Vincenzo Punzo and Biagio Ciuffo, and Marcello Montanino, PhD candidate at the Naples University Federico II, received the 2012 Greenshields Prize for their paper "May we trust results of car-following models calibration based on trajectory data?".

This prestigious prize was named after Dr. Bruce Douglas Greenshields, a pioneer in the field of traffic flow theory and characteristics. The prize was awarded at the Transportation Research Board Meeting of the American National Academy of Sciences, held in Washington DC in January.

PAST EVENTS

Inauguration at the JRC's Institute of Transuranium Elements

From left to right:

Thomas Fanghanel, JRC-ITU Director; Margret Mergen, First Mayor of the City of Karlsruhe; Monika Hohlmeier, MEP; Dr. Helge Braun, Parliamentary State Secretary of the German Ministry for Education & Research; Máire Geoghegan-Quinn, EU Commissioner for Research, Innovation and Science; Günther Oettinger, EU Commissioner for Energy; Dominique Ristori, JRC Director-General.

The official inauguration of the new office building of the JRC's Institute for Transuranium Elements (ITU) took place on 4 February 2013 in the presence of European Commissioner Máire Geoghegan-Quinn, responsible for Research, Innovation and Science and Günther

Oettinger, EU Commissioner for Energy. German representatives from the federal ministry for education and research and from the State of Baden-Württemberg ministry for environment, climate and energy industry also took part in the ceremony.



JRC - Universities: How to increase the contribution of universities to science and innovation

At a roundtable on 11 April the JRC will bring together experts from academia, industry associations and policy-making bodies to discuss the importance of reconciling the needs of universities with those of industry in order to boost innovation, competitiveness and growth in Europe.

The objective will be to identify good practice and future challenges in linking universities and industry through innovation and technology transfer.

Roundtable: Putting Science into Standards

Science has a crucial role to play in the field of standardisation and the speed of this process must be urgently improved if we want European standards to play a global role. The roundtable "Putting Science into Standards: the example

of Eco-Innovation" will be held in Brussels on 24-25 April and will bring together 75 experts in the field of standardisation to discuss how European scientific research can contribute to the standardisation process.

Scientific support and key emerging technologies for SMEs

JRC will welcome about 60 entrepreneurs, researchers and policymakers at its roundtable "Scientific support to innovative SMEs: Key emerging technologies & SMEs", to be held on 25 April 2013 in Brussels. The participants will discuss how collaboration between science and business, academia and industry can strengthen the role of key emerging technologies (KETs) in the

development of the EU industry, especially SMEs.

A first objective of the event will be to identify how KETs can boost the competitiveness of three specific sectors: health, energy and industrial equipment. In addition the event will also aim to identify the scientific support that SMEs need to integrate KETs in their innovation and business strategy.

Science for all at the 2013 JRC Open Day in Ispra

What could be a better theme than 'La scienza per te - Science for you' for the JRC to open its doors again to the public during the European Year of Citizens 2013? Interactive experiments, activities and attractions for all age groups will illustrate how the JRC helps to promote growth, jobs and innovation, a healthy and safe environment, consumer protection and secure energy supplies. Visits to unique laboratories, practical demonstrations, exhibitions and conferences will showcase the science behind European policy-making in a spectrum of areas, from agriculture and global food security, to resource efficiency and public health and security. JRC scientists will give insight into how they develop models and scenarios to assess policy options, analyse satellite images to predict the next big flood, test emissions from all types of vehicles and 'shake' full-size three-storey buildings under earthquake simulations.

Commissioner Máire Geoghegan-Quinn will cut the ribbon to open the brand-new JRC Visitors' Centre which will boast a unique spectrum of JRC's multi-faceted activities.

JRC Ispra, Italy
Saturday, 4 May 2013, 10:00 – 17:00

Programme and registration at:
www.jrc.ec.europa.eu/ispra-openday-2013



Visitors at the 2011 JRC Open Day.

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

Jobs at the JRC

Recently published – Applicants must submit their application no later than the indicated deadline

Karlsruhe, Germany:

Auxiliary Contract Staff (FGIII)

- Communication assistant – 30 March

Petten, The Netherlands:

Post-doc researcher (Cat.30)

- Software code development & fuel cell modelling - 14 April

Seconded National Expert

- Expert in nuclear reactor safety - 25 April

Seville, Spain:

Senior researcher (Cat.40)

- Economic Modeling and Policy Analysis - 2 April

Post-doc researcher (Cat.30)

- Digital Economy Research Programme - 2 April

Ispra, Italy:

Senior researcher (Cat.40)

- Research and Scientific Support in Biokinetics – 15 April
- Privacy and Data Protection - 15 April

Post-doc researcher (Cat.30)

- Development of Water Modelling Platform and Web Services - 1 April

Ph.D. student (Cat.20)

- Road Transport CO2 emissions monitoring and assessment - 1 April

Seconded National Expert

- Scientific support to chemicals mixtures and combined exposure - 25 April

Trainee

- Development of predictive strategies for chemical toxicity - 1 April
- Support to dissemination of scientific information to non-specialists and the general public - 1 April
- Test system and test item characterisation for in-vitro test method validation - 1 April
- Support to Forest Modelling - 5 April

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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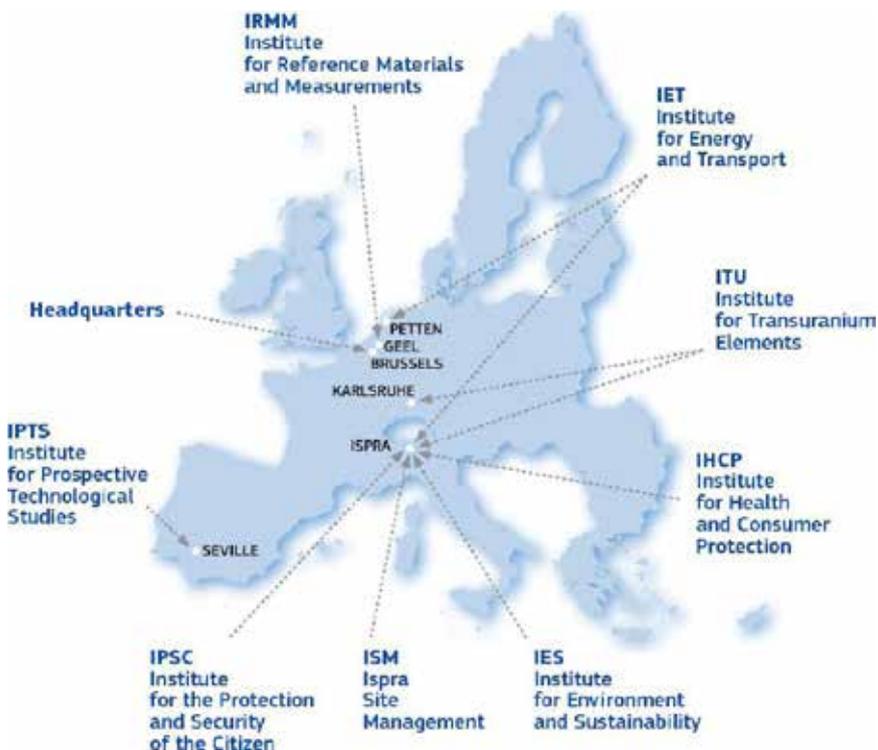
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