

# **Impact analysis of the Joint Research Centre and its direct actions under the EU Research Framework Programmes**

**Final report  
August 2011**

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**Impact analysis of the  
Joint Research Centre**  
and its direct actions under  
the EU Research  
Framework Programmes

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

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## **FOREWORD BY THE DIRECTOR GENERAL**

This report presents an impact analysis of JRC's direct research actions providing science support to EU policies. It looks at the cost of these actions and their economic, environmental and societal benefits for the EU, its Member States and its citizens.

The report is a follow-up to the recent FP7 interim evaluations and a response to consecutive recommendations that the JRC should be more specific and explicit about its achievements. By making this impact-orientated information available the JRC takes a transparent step towards better understanding the fundamentals of its core business, one of the key challenges put forward to the JRC in the FP7 interim evaluation report of the panel chaired by Jeroen van der Veer in 2010.

The timing of this impact analysis report has been chosen such that it provides the necessary evidence to underpin the JRC's direct research in the Commission's budgetary proposals for the period 2014-2020 by feeding into the Impact Assessment that will accompany "Horizon 2020", the Common Strategic Framework of the European Union for Research and Innovation.

I am very grateful to Jan Dekker, František Pazdera, Brigitte Serreault and Lena Tsipouri who put their expertise at our disposal in the Steering Group\* for this report. They have all been members of one or two evaluation panels of the JRC in the past and this experience helped to carry out the analysis efficiently and in an objective way. I particularly retain their point in the discussions that economic benefits measured in monetary terms may not fully express or represent all the public value of the JRC.

The JRC shares the Steering Group's conclusions and their message to promote systematic impact and cost-benefit analysis of JRC activities will be taken to heart, not only because I believe that economic leverage figures will further strengthen the positive image of the JRC, but also because impact analyses like those in the current report provide a deeper insight into the accomplishments of the JRC.

I look forward to implementing the useful suggestions for further optimising JRC activities in support of key policy priorities in the Europe 2020 strategy, thus maximising its effect on the achievement of EU objectives, for the benefit of the EU citizens.

Dominique Ristori  
Director-General, Joint Research Centre

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\* Details of the experts in Steering Group are given in Annex 1



## EXECUTIVE SUMMARY

Following recommendations from JRC programme evaluations and in line with the Commission's principles to focus on EU added value, impacts and results, outlined in the 2010 budget review, this report presents an impact analysis of JRC's direct research actions. The report also feeds into the impact assessment for "Horizon 2020", the EU Common Strategic Framework for Research and Innovation (CSF), thus providing an impact baseline for the JRC's future direct research actions.

The report uses an analytical framework built around policy impact, i.e. the impact of JRC work in the policy process, as well as technical impacts, economic impacts and intangible impacts. It looks at the JRC's achievements, impacts and results with a special focus on costs and benefits and contains four parts:

- Demonstrable policy impacts of JRC activities in 2010;
- Five case studies with specific impacts and benefits of JRC support activities;
- An estimation of the JRC's overall economic impact;
- The JRC and Europe 2020<sup>1</sup>.

### *Demonstrable policy impacts 2010*

The report presents an extensive listing of impacts, linking JRC support activities in 2010 with policies, customers and official documents and publications. The analyses show that the policy impacts are the result of support to the Commission, EU agencies, Member States authorities, international organisations and standardisation bodies. Most impacts occur through or in the Commission. For instance, Commission-related impacts are associated with close to seventy Commission Communications or Staff Working Papers; around forty are linked to a Directive, another forty to a Regulation and a number of references can be found in Commission Decisions. These and other statistics confirm the strong involvement of the JRC in EU policies and legislation and the collective impact is a noticeable factor in the relevant EU policy processes.

### *Case studies*

The report presents specific results in five case studies, addressing the JRC's role and impact regarding the following activities and products:

- the European Integrated Pollution Prevention and Control (IPPC) Bureau in Seville for the implementation of the EU Industrial Emission Directive,

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<sup>1</sup> Europe 2020: a strategy for smart, sustainable and inclusive growth, COM(2010)2020

- the INSPIRE Directive to set up a harmonised Infrastructure for Spatial Information in Europe, probably the largest data-harmonisation effort worldwide,
- the development and operation of Euratom On-Site Laboratories for nuclear safeguards,
- “standards, references and measurements” with examples of the development of BSE tests and a validated test procedure to enforce the EU Chocolate Directive,
- impact assessments underpinning the new Directive for Deposit Guarantee Schemes following the financial crisis in 2008.

These examples include cases of long-term support to policies, like the Industrial Emissions Directive, the INSPIRE Directive and the Euratom On-Site Laboratories. The supported policies can be associated with huge economic interests and large benefits. The Industrial Emission Directive, for instance, concerns over 50 000 installations in the EU. Turnovers in this sector range well over EUR 10 billions with several hundred thousand jobs. The implementation of the directive leads to the prevention of 13 000 premature deaths. Expressed as net monetised benefits, these positive impacts on health alone are estimated between EUR 7 - 28 billion per year.

The Euratom On-Site Laboratories case concludes as most important benefit that its nuclear safeguards give assurance to governments and the public that the European nuclear industry, the European Union and its Member States comply with their legal duties under the Euratom Treaty and their commitments to the Non-Proliferation Treaty. Indeed, not all support is related to quantified economic or monetised benefits.

The case studies show significant impact and several activities lead to savings that are large compared to their costs. The methodology applied only allows order of magnitude estimates for cost-benefit ratios, which range from 1:10 to 1:250.

### *Overall economic impact*

Addressing the overall economic impact, the report considers that the JRC exercises typical functions of a research and technology organisation (RTO) and that it can be seen as “part of the RTO sector”. A recent study, sampling 275 RTOs, demonstrates that RTOs have a combined annual turnover of around EUR 20 billion. Their economic impact estimates are of the order of EUR 100 billion annually. The JRC represents around 1.5% of the total turnover of the 275 sampled RTOs and belongs to a group of larger RTOs. Considering the European dimension and the special profile of the JRC as well as the inhomogeneity in the RTO sample, numbers should be used with caution. Hence, rather than giving a monetised value for the economic impact of the JRC, the conclusion is that cost-benefit ratios for the JRC are favourable and that its return on investment is sizeable and significant.

### *JRC and Europe 2020*

Regarding the expectations of future impacts, the report examines continuation of ongoing successful JRC activities as baseline in an incremental scenario with a number of reorientations and new activities in response to changing political priorities. The baseline impacts are an extrapolation from the situation today anchored in the fruitful interaction between the JRC's science and the "science sensitive" policies like environment, climate change, energy, transport, health, agriculture, ICT, industry, etc. This will continue to generate significant impact under the Horizon 2020 Common Strategic Framework.

The adoption of the "Europe 2020" strategy in 2010 is a key change in the political environment and the JRC is prepared to demonstrate its flexibility to respond effectively. The report assesses that the JRC is active in many areas of the flagships of the Europe 2020 strategy and that JRC's permanent support to EU policies will generate their impacts at different stages of the policy cycle. All flagships will benefit from adaptations in the programme, serving the new political priorities by refocusing of existing capacity. A new horizon-scanning and anticipation function as well as the capacity for exploratory research should keep the JRC at the forefront of developments in science, policy and society to enable a quick response and an effective operation in the period 2014-2020.

### *Experts' Commentary*

The impact analysis report closes with a number of findings and forward-looking conclusions of the Steering Group, summarised below.

- The JRC has the great advantage of being an impartial organisation in a pan-European setting and the Steering Group underlines the absolute need for the EU to keep up the JRC as the Commission's in-house scientific service, because of its unique European dimension, its output and impact often for the direct benefit of the EU citizens, and the Commission's need to have in-house access to scientific knowledge and information independent of national and private interests.
- The JRC has to stay at the forefront of science and technology and continuously develop its knowledge base to facilitate that the best and the most responsible decisions can emerge in policy areas where science plays a sensitive role. Connections with the scientific community through staff exchange are an important element to achieve this, while it also brings side benefits in training and education.
- The European added value of the JRC is rooted in its pan-European scope and range of action. This gives JRC a relatively strong weight in international operations and helps to establish JRC methods as leading examples. To strengthen these effects for the benefit of the competitiveness of the European economy the JRC could usefully enhance cooperation with industry.

- The JRC can promote stronger integration in the production of knowledge in the EU. In particular the JRC should strive for full data availability and information sharing across academic disciplines, research and technology organisations, governmental bodies, the public and private sectors, and nations around the world, keeping in mind the economic interest of the EU.
- The JRC should have the necessary resources to continue delivering on its mission of science support to policies. The Commission, as major user of its work, will play a particular role and where possible Commission policy Directorates General have to steer JRC's programmes, understanding that science support nowadays no longer works from a deterministic view and cannot produce one-dimensional answers to complex questions.
- To answer more specific questions in monetary terms, further study and empirical research is necessary. Based on a larger number of such studies, it would be possible to draw more precise conclusions and to quantify the cost-benefit ratios of individual programmes or projects. The Steering Group recommends the JRC conducting such impact analyses and cost-benefit studies systematically in the new JRC programme.

## 1 INTRODUCTION

Recent evaluation reports<sup>2,3</sup> of the direct research activities expressed favourable opinions on the JRC in view of its mission<sup>4</sup>. They triggered the European Parliament<sup>5</sup> to emphasise the importance of the JRC and its “contribution to sustainable development, competitiveness and the security and safety of nuclear energy”. These evaluation reports also gave the JRC a number of useful recommendations for further improvement.

One suggestion in particular was that the JRC should make a dedicated effort to better explain its core “business” and the impacts of its work by documenting and analysing their results and making them available publicly. This is fully in line with today’s need for EU spending programmes to account for their budget in more detail, confirmed in the 2010 budget review when the Commission outlined its principles to focus on EU added value, impacts and results. At this time of budgetary austerity governments have to strengthen their control and the need to demonstrate the effectiveness and efficiency of public research funding is stronger than ever before.

Against this background the JRC prepared the current report, responding to today’s demand for a stronger focus on output, impacts and results, and focusing on costs and benefits. The information presented in the report not only reinforces the evidence-base for future ex-post evaluations, it also provides an underpinning for the direct research actions in the “Horizon 2020” Common Strategic Framework for Research and Innovation (CSF). As such, it will help policy makers in the European Parliament, in the Council and in the Member States understand the key role of the JRC as well as its position in the EU.

To give the report the necessary evaluative character the JRC asked a Steering Group of external experts to accompany the impact analysis and the preparation of the report. The members of the Steering Group participated in earlier evaluations of the JRC, which ensured the proper level of knowledge of the organisation.

The outline of the report is as follows: Chapter 2 explains the framework of the impact analysis, the applied methodology and the role of the Steering Group. Chapter 3 provides an up-to-date and broad overview of the JRC’s activities

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<sup>2</sup> “King report”: Ex-post Evaluation, Joint Research Centre Direct Actions in the 6th Framework Programmes (2002-2006), Final Report 2008 and the response from the Commission: SEC(2008)3105

<sup>3</sup> “Bernard report”: Interim evaluation of the direct actions of the Joint Research Centre (JRC) under the 7th Euratom Framework Programme (2007-2011), Final report 2010

“Van der Veer Report”: Interim evaluation of the direct actions of the Joint Research Centre (JRC) under the 7th EC Framework Programme (2007-2013), Final report 2010

<sup>4</sup> The JRC’s mission is to provide customer-driven scientific and technical support for the conception, development, implementation and monitoring of EU policies. As a service of the European Commission, the JRC functions as a reference centre of science and technology for the Union. Close to the policy-making process, it serves the common interest of the Member States, while being independent of special interests, whether private or national

<sup>5</sup> Report on the mid-term review of the 7th Framework Programme for Research A7-0160/2011 and its motion for a resolution adopted in the European Parliament resolution T7-0256/2011 of 8 June 2011

and their immediate impacts. Chapter 4 presents a number of case studies of impact in a longer-term perspective, whilst Chapter 5 considers the JRC as part of the broad sample of research and technology organisations in Europe. Chapter 6 projects JRC activities and their impact towards the future from the perspective of the EU policy orientations, laid down in the Europe 2020 strategy. In the last Chapter the Steering Group summarises the findings and formulates conclusions of the impact analysis.



## 2 THE JRC, THE ANALYTICAL FRAMEWORK AND THE METHODOLOGY

After a general introduction of the JRC and its direct research activities, this chapter describes the analytical framework and the methodology applied for the impact analysis.

### 2.1 About the JRC

The JRC is the Directorate-General responsible for the direct research actions of the Commission. It has an annual budget of around EUR 400 million with a staff table of 2700 people. From its head offices in Brussels it runs seven JRC institutes with a range of laboratories and unique research facilities, located at five sites in Belgium, Germany, Italy, the Netherlands and Spain<sup>6</sup>.

The research activities of the JRC are multifaceted and range from supporting the implementation of EU legislation via monitoring and verification services, performing prospective studies and modelling, through to scenario building, supporting statistical analyses as well as acting as European centre for reference materials, standards and measurements and operating a number of key facilities for Europe.

Important recipients<sup>7</sup> of JRC scientific support are the European Commission itself, but also the European External Action Service, the EU Council Secretariat and the European Parliament. Further recipients are found in the Member States and in the context of support to national authorities and organisations responsible for the implementation and monitoring of EU policies. The JRC also carries out work for, or in cooperation with many of the EU Agencies<sup>8</sup> as well as international organisations<sup>9</sup>.

Behind these institutional recipients are the citizens of the European Union. They are the ultimate beneficiaries and this is most evident in work for instance related to food, safety, health and the protection of the environment.

As a networked organisation the JRC creates mutual benefits with many partners in joint policy support and research activities; it cooperates with more than 1000 partner organisations across Europe and world wide. These partners are other research organisations, regulatory authorities, national or regional authorities, control laboratories, universities, industrial companies and industry associations.

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<sup>6</sup> Geel - Belgium; Karlsruhe - Germany; Ispra - Italy; Petten - The Netherlands and Seville - Spain

<sup>7</sup> The report presents impact tables later in Chapter 3 and the annexes with information on the recipients and the subject of the support given

<sup>8</sup> Such as the European Environment Agency (EEA), European Food Safety Agency (EFSA), European Chemicals Agency (ECHA), EU Satellite Centre (EUSC)

<sup>9</sup> Such as the International Atomic Energy Agency (IAEA), Organisation for Economic Development (OECD), European Investment Bank (EIB), United Nations (UN), European Space Agency (ESA)

The JRC keeps abreast of the scientific and technological developments through its own research activities, participation in international research consortia and via cooperative efforts in networks with public and private organisations in the Member States and Associated Countries. It publishes around six hundred peer-reviewed scientific articles and about as many technical reports per year.

The JRC's archive of programme evaluations dates back to the 1980s and past evaluations triggered continuous improvements in the organisation and its work. The JRC's evaluation practices have evolved in time and the current report responds to today's demand for a stronger focus on impacts and results. In this respect the analytical framework and the methodology outlined below, should reinforce the evidence-base for future evaluations.

## **2.2 An analytical framework for the impacts**

The analytical framework for this report contains before all a concept called “policy impact”, which the JRC applies to establish the mission-alignment of its actions<sup>10</sup>. This “policy impact” refers to impact of JRC work, which occurs almost immediate since the deliverables feed directly into the policy process. The advantage is that the JRC assesses this “policy impact” on an annual basis (cf. Chapter 3.1) and keeps relevant information for every individual action.

The framework also includes three other types of impacts, i.e. technical impacts, economic impacts and impacts on more intangible assets referred to as “intangible impacts”, frequently distinguished and used in evaluation studies. Hence the analytical framework uses the taxonomy below, illustrated with some examples.

- Policy impacts
  - JRC results are used and/or referred to in an official EU policy document, e.g. Communication from the Commission, EU Regulation, EU Directive, Council Conclusion;
  - JRC plays a key role in the implementation of adopted EU policy or legislation, e.g. Industrial Emissions Directive, Water Framework Directive, INSPIRE, Common Agricultural Policy controls, Community control system for ensuring compliance with the rules of the Common Fisheries Policy, radioactivity monitoring in the environment;
  - A JRC result/method/standard is used and/or referred to at international level e.g. by International Atomic Energy Agency (IAEA), the United Nations' Food and Agriculture Organization (FAO), the International Standardization Organization (ISO);

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<sup>10</sup> A JRC “action” is the smallest administrative entity for implementing the JRC programme. Each action has its own set of objectives and associated resources. Therefore “action” often simply reads like “project” (i.e. one specific task of investigation), but it should be noticed that actions typically encompass more than one project and change content over time.

- JRC develops new means for (policy) implementation, e.g. validated test method or procedure for compliance with regulation, “bureaus”, a clearinghouse for nuclear incidents, European Coordination Centre for Accident and Incident Reporting (ECCAIRS), European Centre for the Validation of Alternative Methods (ECVAM).
- Technical impacts
  - better products, e.g. as a consequence of improved food tests, standards for food and feed additives;
  - (better) standards, more effective tests (e.g. for GMOs), innovative alternatives to animal testing;
  - better economic measurements, e.g. properties of nano-sized particles, validated test methods for food, environment;
  - user innovation and service innovation, i.e. products and services developed or refined with the users or at the site of implementation;
  - protection or improvement of the environment, e.g. climate change modelling, implementation Directive on Ambient Air Quality and Cleaner Air for Europe (the “CAFE” Directive), Nitrates Directive;
  - better legislation because of understanding of risks, e.g. REACH for the Registration, Evaluation, Authorisation and Restriction of Chemicals;
  - risk reduction/transformation, e.g. nuclear safeguards, GMOs, REACH, forest fire monitoring, flood monitoring, damage assessment after natural catastrophes, control of major accident hazards (Seveso Directives).
- Economic impacts
  - indirect e.g. by (enabling the) implementation of an EU policy, introducing more precise and/or cheaper measurements, better regulation, standardisation, or making partners invest more because of collaboration;
  - direct on the market through innovation, through outsourcing and spin-off, or through the development or purchase of special products (e.g. animal tagging, satellite imagery);
  - new standards help companies to become more competitive which contributes to growth and creates employment.
- Intangible impacts
  - enhance European cooperation and human capital through collaboration and exchange of staff, learning, training of non-JRC staff, knowledge sharing and problem solving;
  - enhance science and introduce scientific knowledge into policy decision, enhance European research, a relation of trust with the recipients of support;

- positive effect on competitiveness, e.g. the reputation and being a Commission service make collaboration with the JRC attractive.

### **2.3 Methodology**

The methodology for this impact analysis was designed to investigate to what extent :

- the JRC supports the introduction of science and scientific knowledge in the policy Directorates General of the Commission;
- JRC scientific and technical support has demonstrable impacts on EU policies;
- JRC activities generate economic impacts with a return on investment.

The methodology uses a qualitative approach to look into the first two questions. The third question assumes that funding for science should be considered as an investment. This requires a look at the JRC in an economic context, aware that monetised benefits express only part of the public value of JRC activities. Hence, the methodology makes a three-way analysis examining:

- the immediate impact or so-called “policy impact” from thematic parts of the JRC programme (Chapter 3);
- the impacts of some cases of long-term support, whereby the subjects of these case studies have been selected with the help of the Steering Group (Chapter 4);
- data on the overall economic impact of research and technology organisations in Europe to allow an estimate of the JRC overall return on investment (Chapter 5).

Impacts on science, knowledge, and the scientific literature are outside the scope of this analysis.

Finally the analysis includes a prospective element by examining the question of future (2014-2020) impacts from JRC activities in an incremental scenario made up of core activities, adaptations in support of the “Europe 2020” strategy<sup>1</sup> and responses to unforeseen developments.

## 3 THE IMMEDIATE “POLICY IMPACT” OF JRC ACTIVITIES

### 3.1 Monitoring “policy impact”

The JRC monitors key information about its direct research actions using an internal project-information data infrastructure. This has helped to build up a knowledge-based view on how JRC actions<sup>30</sup> relate to customers (EU institutions, national ministries, international organisations, authorities or industry), to policies (their conception, development, implementation and monitoring) and often to both, i.e. the policy-making customers and the policies for which they are responsible.

Since 2004 the JRC annually checks the performance of its actions in the so-called periodic action review (PAR). In this internal review every JRC action receives a score for “policy impact” with a view to monitoring this parameter over time. Whereas the term “policy impact” has a broad meaning, for the JRC and in this report it is a well-defined multi-dimensional indicator e.g. it counts the instances that:

- the JRC directly implements the technical parts of a regulation (e.g. the Industrial Emissions Directive, see Chapter 4.1);
- a JRC nuclear reference material is recorded in for instance a reference documents from the International Atomic Energy Agency (IAEA);
- a JRC test method is adopted by an international standardisation body (e.g. the Chocolate Directive, see Chapter 4.4.2);
- a JRC report is used or referred to in an official EU policy document, (e.g. Deposit Guarantee Schemes Directive, see Chapter 4.5).

Regarding the latter it is noted that official EU documents alone are often not sufficient for tracking JRC deliverables. Official documents rarely mention contributions from individual services. Hence a JRC report that provides important data in support of action outlined in a Commission Communication becomes hard to trace via the usual open reference “.... based on estimates made by the Commission services”. However, JRC’s internal monitoring functions would usually keep track of these kinds of applications of JRC deliverables.

The JRC monitors the policy impacts of its actions and in 2006 for instance, the internal action reviews indicated that roughly half of the actions achieved a tangible-and-demonstrable policy impact. Since then the percentage steadily increased to around 85% in 2010. Because some activities may not generate immediate tangible impact<sup>31</sup>, this percentage may not become much higher and where possible continued progress could be achieved by optimising

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<sup>31</sup> A new activity or exploratory research rarely generates immediate policy impact. Other example: a validated measurement method generates an impact only once (when the standard/method is formally adopted) but full establishment of a method may take a group of people several years.

the essence of the impacts in a resource perspective. The large number of JRC activities generating tangible policy impact today, together build a good sample for making a meaningful analysis of JRC's core business.

The following sections analyse the policy impacts in 2010 to develop a better idea about the recipients of the work and the achieved impacts summarised in Annex 2 of this report.

### 3.2 Policy impact in thematic sectors

Following recommendations in the ex-post FP6 evaluation<sup>2</sup> the JRC adopted a structure for its work that allows competence and sector-oriented evaluation under the headings:

- Sustainable management of natural resources
- Safety of food and consumer products
- Development of a low carbon society (Energy and transport)<sup>12</sup>
- Security and crisis management (Security and anti-fraud)<sup>12</sup>
- Towards an open and competitive economy (Contribution to the Lisbon agenda)<sup>12</sup>
- Nuclear safety and security - Euratom

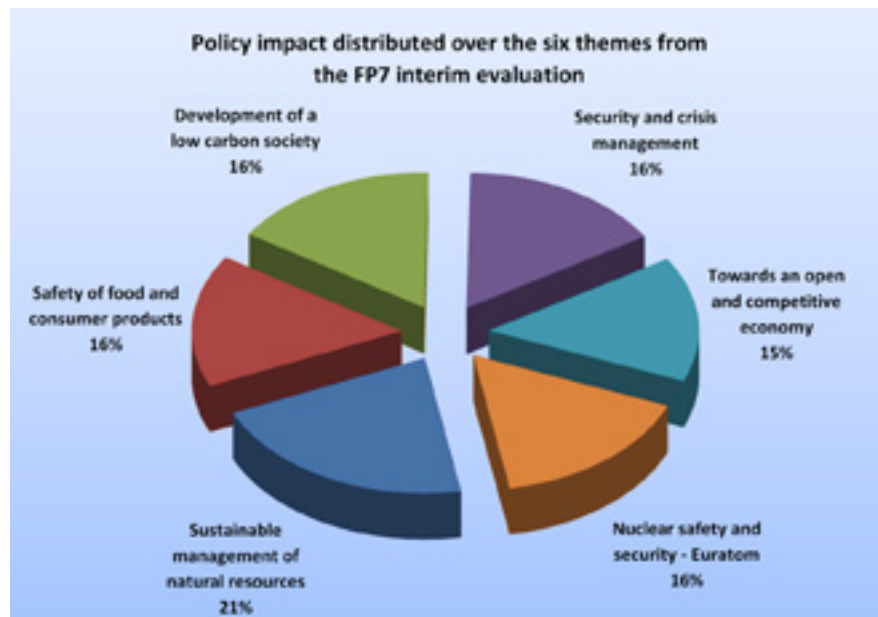


Figure 1. The high-score tangible policy impacts of the direct research actions are evenly distributed over the six themes evaluated in the interim FP7 evaluation. Percentages correspond to the share of the counted policy impacts.

<sup>12</sup> New titles as used in the JRC 2012 work programme and between brackets the corresponding titles in thematic evaluation structure

These six headings represent the evaluation structure that was applied in the FP7 interim evaluations. These headings are used to arrange the policy impacts in Annex 2 in six policy-impact tables.

The overall result of the tables is that the JRC actions in 2010 registered around 230 significant policy impacts, roughly equally distributed over the different evaluation areas as shown in the pie-chart in Figure 1.

The diversity of impacts captured by the “policy impact” indicator is too broad to draw conclusions from the numeric sum value as such, but the collective policy impacts specified in Annex 2 lead to the conclusion that JRC activities generate significant policy impact. With this conclusion the next question is how the impact is distributed amongst customers.

### 3.3 Policy impact: the recipients

Deeper analysis of the underlying detailed information about customers, beneficiaries and partners in the impact tables (Annex 2) shows again a broad range of recipients of JRC deliverables with EU agencies, Member States authorities, international organisations and standardisation bodies. It also shows that round 75% of the impacts were achieved within or through the Commission (Figure 2).

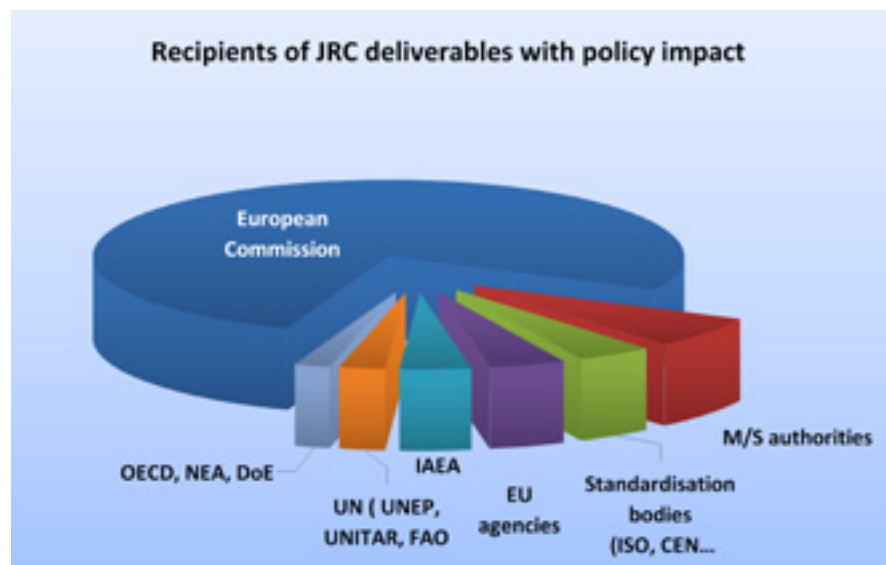


Figure 2. Pie chart showing the distribution of around 230 instances of demonstrable impact achieved in 2010 over the recipients of the deliverables.

Further examination makes clear that the Commission-related impacts are associated with almost seventy Commission Communications or Staff Working Papers (ratio 3:1), around forty link to a Directive, another forty to a Regula-

tion and several references can be found in Commission Decisions, showing that the JRC is involved in every phase of the policy cycle, from conception and development through to implementation and monitoring of policies.

Taking the analysis of the recipients a step further, Figure 3 displays the number of impact counts for the various receiving policy areas within the Commission. The impact is distributed over a large number of policies whereby about 30% of the policies account for roughly 75% of the impacts. Science plays a particularly sensitive role in policy areas involving people’s health, people’s safety, security, the environment as well as the competitiveness of the European economy.

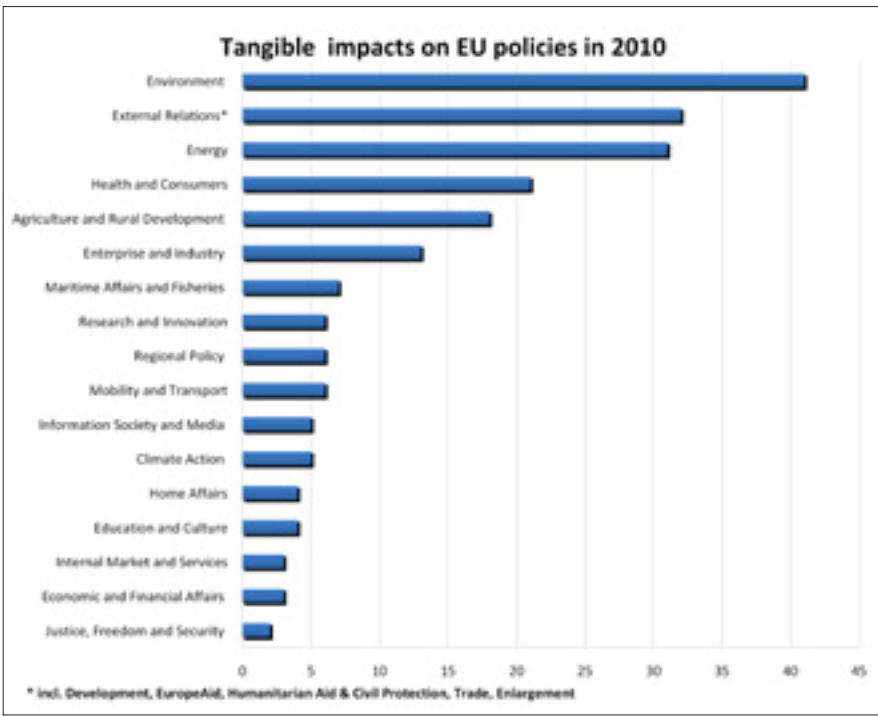


Figure 3. Policy Customers and the number of cases of tangible and demonstrable “policy impact” from JRC actions in 2010

In summary, the tables in Annex 2 show that impacts come from support to EU agencies, Member States authorities, international organisations and standardisation bodies, but the largest part of the impacts occur through or in the Commission, for the benefit of a broad range of policies in all phases of the policy cycle. The statistics from the impact tables confirm the tight link of JRC work with EU policies and although there is no measure for the size of the collective impact, it must be a noticeable factor in the relevant EU policy processes.



## 4 CASE STUDIES OF LONGER-TERM IMPACT OF JRC ACTIVITIES

This chapter presents cases studies of the longer-term impact of JRC work under the last three framework programmes (1999-2013).

The JRC Work Programme counts more than one hundred and twenty actions. These actions are a heterogeneous sample as regards their size, lifetime and nature. They can be small or large scale, short or long-term, scientific or technical and all possible combinations between them. The vast majority of JRC actions serve policy-related goals and display tangible impacts in the day-to-day policy making of the Commission (cf. Chapter 3) and many of them would qualify for further analysis. Nevertheless, the number of potential cases for further study in the impact analysis had to be limited to give the selection a manageable size.

For making a pre-selection, the Steering Group experts proposed the following criteria:

- the case should have reached a stage that allows ex-post assessment
- economic impact information should be available for the case
- amongst the selected cases there should be
  - a thematic balance, as well as
  - a balanced distribution of the nature of the impact (direct, indirect, economic, technical, intangible)

From the resulting pre-selection the experts retained the following cases for further elaboration:

- the European IPPC Bureau in Seville for the implementation of the EU Industrial Emission Directive;
- the INSPIRE Directive to set up a harmonised Infrastructure for Spatial Information in Europe, probably the largest data-harmonisation effort worldwide;
- the Euratom On-Site Laboratories for nuclear safeguards;
- “standards, references and measurements” with examples of the development of BSE tests and the international ISO standard for chocolate;
- impact assessments underpinning the new Directive for Deposit Guarantee Schemes following the financial crisis in 2008.

Each of the case studies describes the subject, the role of the JRC and its impact.

## 4.1 The European IPPC Bureau

### 4.1.1 Background

In 1997 the JRC set up the European Industrial Pollution Prevention and Control (IPPC) Bureau in Seville to organise an exchange of information as part of the implementation of the IPPC Directive<sup>13</sup>. Today, this Directive and six other pieces of legislation related to industrial emissions have merged into one overarching Industrial Emissions Directive (IED), which saw its latest revision<sup>14</sup> in 2010.

The Directive regulates the emissions from a wide range of industrial and agricultural activities. This concerns about 50 000 installations in the EU, such as large combustion plants, waste incinerators, refineries, production and processing of metals, mineral industry, intensive rearing of poultry and pigs, other activities (e.g. pulp and paper, textiles, slaughterhouses, tanning, food industry). The Directive covers key atmospheric pollutants as indicated in Table 1.

Key atmospheric pollutants and the percentage coming from installations <sup>15</sup> falling under the Industrial Emissions Directive	
CO <sub>2</sub> (anthropogenic)	55%
SO <sub>2</sub>	83%
NO <sub>x</sub>	34%
Dust	43%
Volatile Organic Compounds emissions	55%
NH <sub>3</sub> (ammonia) emitted by agricultural installations	38%
Hg (mercury) emissions	23%
Dioxin emissions to air	25%

Table 1. Key atmospheric pollutants with their percentage coming from installations under the Industrial Emissions Directive (ref. 14)

It aims at the integrated prevention and control of the consumption of energy, water, raw materials and chemical auxiliaries as well as the prevention and control of pollution to water, air and soil, also by minimising the generation of waste. The alignment of the environmental performance requirements for industrial installations also creates a level playing field for the industry.

Under the terms of the Directive the Commission has to “organise an exchange of information between Member States, the industries concerned, non-governmental organisations promoting environmental protection and the Commission”. The European IPPC Bureau at the JRC in Seville fulfils this duty

<sup>13</sup> Directive 96/61/EC - codified 2008/1/EC

<sup>14</sup> Directive 2010/75/EU of the European Parliament and of the Council of 24 November 2010 on industrial emissions (JO L 334/17 of 17.12.2010)

<sup>15</sup> The remaining percentage is coming from other sources like e.g. transport, domestic combustion

and organises the so-called “Sevilla process” to ensure a scientifically and technically sound outcome of the information exchange process.

#### **4.1.2 Role of the JRC**

The IPPC Bureau defines the standards of the technology for each sector covered by the Directive (the so-called BAT, Best available techniques<sup>16</sup>) and formalises this in the BAT reference documents (BREFs). In practice this means that the JRC drafts, reviews and updates the BREFs in consultation with Member States, industry representatives, environmental NGOs and the Commission. In a final step, the competent authorities in the Member States grant operating permits to plant operators based on the technical content of the BREFs.

Each BREF is the outcome of a three to four years process steered by the Bureau and involves up to 150 experts, including the formal representatives from all Member States. The BREF documents are formally adopted by the IED Article-75 Committee upon proposals prepared by the Commission according to the legal provisions of the IED.

The JRC carries out this work in support of the Environment DG because of the techno-economic and scientific nature of the BREFs. The work includes support in the legal adoption process, in the consultation process within the Commission, in the Committee established by the Article 75 of the IED as well as in Council and Parliament.

The IPPC Bureau has completed thirty three BREFs and the latest revision of the Directive will require at least two new BREFs bringing the total up to thirty five. Since the concept of “best available techniques” is a dynamic one, these BREFs are documents in permanent revision; new techniques may emerge, technologies develop further, or industry may introduce itself more-resource-efficient or less-polluting processes. The Directive stipulates that the Commission should aim at reviewing the whole series of BREFs every eight years.

The IPPC Bureau also establishes guidelines for the “exchange of information”, which make sure that stakeholders provide data of sufficient quality and quantity to determine the best available as well as emerging techniques. These guidelines are also adopted through committee procedure.

The IPPC Bureau derives its authority largely from the neutrality of JRC staff. Yet, the Bureau would not work without the involvement of more than 1200 experts in the technical working groups coming from the twenty seven Member States, from other European countries (EFTA and Candidate and Accession Countries), from different parts within the services of the European Commission, industrial associations and environmental NGOs, all giving life to the Sevilla process.

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<sup>16</sup> “Techniques” in BAT refers to both the technology used and the way in which the installation is designed, built, maintained, operated and decommissioned

#### 4.1.3 Impacts and benefits

The Industrial Emissions Directive confers the implementing powers to the Commission, for instance to adopt guidance on data collection and the drawing up of BAT reference documents. As a Commission service, the JRC has the technical expertise and the unique position to guarantee neutrality and to fulfil these implementing powers through the IPPC Bureau in a politically and economically efficient way. The JRC runs the IPPC Bureau for an annual amount around EUR 2 million mainly dedicated to human resources. Through the drafting of the BREFs necessary for the implementation of an EU directive, this investment generates a highly visible and tangible impact on EU policy.

##### *Technical and economic impact*

The JRC is the enabling factor to reap the economic, environmental and societal benefits of the Industrial Emissions Directive. These benefits concern the health of people, (materials of) buildings, as well as crops and ecosystems in the environment. The IED impact assessment<sup>17</sup> estimated that for the large combustion plant (LCP) sector alone the implementation leads to the prevention of 13 000 premature deaths, which is equivalent to annually saving 125 000 life years. Taking into account EUR 2 billion costs associated with meeting BAT associated emission levels for LCPs, the net monetised benefits from these health impacts alone are between EUR 7 - 28 billion per year<sup>18</sup>. This example concerns the LCP sector and considers only health benefits. Significant health and environmental benefits are also to be achieved in other sectors.

The impact assessment<sup>17</sup> also indicates that the air pollution control sector, with about EUR 16 billion of turnover in 2004, represents around 10% of the total European eco-industry and 180 000 jobs. The growth in the wider pollution management sector has led to an increase of jobs from 1.45 to 1.85 million between 1999 and 2004. The air pollution control sector is the largest export sector of the EU eco-industry with EUR 2.9 billion annual sales.

The impact of the JRC's work on the BREFs is most noticeable in the Member States; they are the ultimate beneficiaries of the reference documents coming from the Sevilla process whilst the process remains open to improvements proposed by Member States. In the counterfactual situation, every Member State would have to elaborate them individually, which would certainly increase cost as well as administrative burden. The impact assessment<sup>17</sup> estimates savings of EUR 105 - 255 million per year due to a net reduction of administrative burden in the Member States.

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<sup>17</sup> Impact Assessment accompanying the Proposal for a Directive of the European Parliament and of the Council on industrial emissions - SEC(2007) 1679

<sup>18</sup> Depending on the method used for the valuation of mortality impacts, i.e. the value of statistical life (VSL, applied to the change in number of deaths) or the value of life year (VOLY, applied to changes in life expectancy)

The application of the BAT standards has led to a higher uptake of technologies with state-of-the-art economic and environmental performance, in areas that are known for their slow integration of new technologies. More in general, this higher uptake of new technologies also has positive impacts on the development and employment of eco-industry in the EU, already a larger employer than the car industry. Between 2004 and 2008 the core of the European eco-industry grew by 8% each year<sup>19</sup>, an increase well above average, generating a turnover of more than EUR 300 billion in 2008. In the same year the sector directly employed 3.4 million people and spent approximately EUR 5 billion on research and development. The worldwide growth rate of the eco-industry is forecasted to be 5.4% per year over 2005-2020 to reach a global market value of EUR 2.2 trillion (compared to EUR 1 trillion in 2005).

In addition, the implementation of the IED is also needed to achieve environmental targets in the EU. There is a serious gap between the Member States' 2020 predictions for the SO<sub>2</sub> and NO<sub>x</sub> emissions from large combustion plants and the objectives for reducing air pollution by 2020 set in Europe's Thematic Strategy on Air Pollution<sup>20</sup>. Full-scale implementation of the Industrial Emissions Directive (i.e. using the best available techniques as prescribed in documents prepared by the JRC) will reduce this gap by 30 - 70%.

### *Intangible impact*

The way in which the JRC shaped the IPPC-Bureau and the "Sevilla process" has created a powerful example of effective EU environmental policy implementation and third countries emulate the JRC model with BATs and BREFs in other parts of the world.

- Indeed other Commission services asked the JRC to design structures on the model of the IPPC Bureau for the implementation of other EU legislation in the field of sustainable production and consumption (Eco-label, Eco-design, Energy Efficiency, Waste and Recycling, Eco-management and Audit Schemes etc.)
- At international level countries like Israel and Brazil have incorporated the BAT concept in their legislation. Russia, China, India, Ukraine are just a few examples of countries in which the permitting authorities use the BREFs as a reference for their industries and for industries which have emissions with transboundary effects. Moreover, third countries frequently solicit the JRC for technical advice to settle cases of industrial emissions.

<sup>19</sup> European industry in a changing world, updated sectoral overview, SEC(2009)1111 and a Study on the Competitiveness of the EU eco-industry (2009) within the Framework Contract of Sectoral Competitiveness Studies – ENTR/06/054

<sup>20</sup> Thematic Strategy on Air Pollution, COM(2005) 4

## **4.2 The INSPIRE Directive**

### **4.2.1 Background**

The INSPIRE Directive 2007/2/EC is one of the key pieces of legislation in European environmental policies. It provides the framework to collect, harmonise or organise the dissemination or use of spatial information in the EU and it allows many initiatives<sup>21</sup> taken at national and EU level to become interoperable.

INSPIRE is also linked to the Directives 2003/4/EC on the public access to environmental information and Directive 2003/98/EC on the re-use of public sector information by their complementary objectives regarding the efficient public data use, the transparency in decision making and the open access to public information.

The origin of INSPIRE goes back at least to the early 1990s, during the advent of the information society, when public and private services started to use Geographic Information Systems (GIS), which essentially contain computerised topological maps with various layers of information. This development opened up huge possibilities to combine geographical data and maps into Spatial Data Infrastructures (SDI) for urban planning; resource management, environmental impact assessment, location planning, or crisis interventions, just to mention a few. However, there were problems with the quality, organisation, accessibility and sharing of the data because the lack of agreement on standards at the time made it cumbersome and sometimes impossible to combine data sets across borders.

Today the EU has solved many of these standardisation issues through INSPIRE's legal framework for harmonised spatial data. It created the appropriate conditions for having harmonised and high-quality spatial (geographic) information readily available across the different public authorities and the different sectors in the EU at local, regional, national and European level.

### **4.2.2 Role of the JRC**

With its experience as a pioneering user and producer of GIS and geospatial data, the JRC has been on top of spatial data since the mid 1980s when earth observation satellites created a rapid increase of geospatial data and computerised maps. Major initiatives to harmonise spatial data in the United States and Europe go back to 1994 when the US announced a National Spatial Data

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<sup>21</sup> For instance: the implementation of a European pollutant emission register (EPER) according to Article 15 of Council Directive 96/61/EC, Regulation (EC) No 2152/2003 concerning monitoring of forests and environmental interactions in the Community (Forest focus) under Community funded programmes like for example CORINE land cover, European Transport Policy Information System, as well as the global initiatives GALILEO (the European satellite navigation system) and GMES (Global Monitoring for Environment and Security)

Infrastructure (NSDI) and the European Commission launched the development of a policy framework for Geographic Information in Europe (the GI-2000 initiative) a few months later.

The GI-2000 initiative evolved into INSPIRE, both closely followed and supported by the JRC in the consecutive framework programmes for research (FP): from anticipation and conception in FP5, to development in FP6 and FP7, and implementation in FP7. Whilst the Environment DG is the policy maker behind the INSPIRE Directive, the JRC takes the central role of overall technical coordinator and Eurostat is the Commission service that will take over the operations of the infrastructure including the European geoportal<sup>22</sup>, once it has been developed.

In 2005 the JRC formalised tri-lateral collaboration with Natural Resources Canada and the US Federal Geographic Data Committee, which have the responsibility for the technical coordination of the spatial data infrastructures in Canada and the USA respectively. This work has developed further in the context of the Group of Earth Observation Systems of Systems (GEOSS), an initiative supported by eighty-six governments, the European Commission, and sixty-one intergovernmental and international organisations with a mandate in earth observation.

The JRC is responsible for the development of the INSPIRE technical specifications (Implementing Rules) and the European Geoportal. It also initiates and monitors the work with international standardisation bodies<sup>23</sup>. The development of the INSPIRE Implementing Rules requires coordinating the work of hundreds of experts from the Member States to ensure that the technical specifications are not only technically sound but also organisationally and financially feasible, and that they can be accepted and implemented successfully by the Member States.

The development of the Implementing Rules for INSPIRE in the EU requires a high level of technical expertise and independence of national and industrial interests. The JRC possesses the neutrality needed and the relevant expertise, which has taken it to the point where it drafts the text of the regulations submitted to the Regulatory Committee.

#### **4.2.3 Impacts and benefits**

In Europe the JRC is strongly associated with INSPIRE since it has pro-actively pushed the standardisation from the early days of the development of the new technologies and new techniques. At world level INSPIRE gives Europe a

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<sup>22</sup> The European Geoportal is a web portal to find and access geographic information (geospatial information) and associated geographic services via the Internet. In general, geoportals are the gateways to geographic information systems (GIS) and a key element for the use of Spatial Data Infrastructure (SDI).

<sup>23</sup> ISO TC 211, CEN TC 287, Open Geospatial Consortium (OGC)

strong basis to remain pro-active by “exporting” the spatial data infrastructure model to other countries as well as regional and international organisations.

### *Technical, economic and intangible impact*

INSPIRE is an example of diverse impact of JRC’s work built up over a long period. The regional case studies show that it becomes feasible to carry out a thorough ex-post impact analysis, but they also trigger the question: how meaningful is impact evaluation when we consider the short time frames that we are usually working with? This example confirms that there are certainly cases that may take ten years or more before a fair assessment of economic benefits can be made.

An extended impact assessment<sup>24</sup> of the INSPIRE proposal in 2004 analysed the environmental, social, and economic impacts of the Directive and presented estimates of costs and benefits for the environmental sector. It estimated the total benefits in the European Union at EUR 0.7 - 1.1 billion per year. Since investments at national, regional and European level are estimated at around EUR 100 million per year the cost-benefit ratio reaches 1:10 taking into account only the effects in the environment sector. The key benefits and their estimated economic value associated with INSPIRE are summarised in Table 2.

Benefits from INSPIRE	Estimated per year at
More efficient Environmental Impact Assessments and Strategic Environment Assessments	60 – 121 million EUR
More efficient environmental monitoring and assessment	64 million EUR
More cost-effective expenditure on environmental protection	192 million EUR
More cost-effective on environmental acquis	32 million EUR
More effective implementation of EU projects	3 - 8 million EUR
More effective expenditure on Trans-European Networks	90 million EUR
Reduced duplication of spatial data collection	25 - 160 million EUR
Improved delivery of risk prevention policies	77 - 256 million EUR
Improved delivery of health and environment policies	224 million EUR
<b>Total benefits per year</b>	<b>770 - 1150 million EUR</b>

Table 2. Summary of estimated benefits from the implementation of the INSPIRE Directive (ref 24)

The JRC carried out two studies on the use of spatial data in larger regions of the Union Catalonia (Spain)<sup>25</sup> and Lombardy (Italy)<sup>26</sup> and regional Dutch

<sup>24</sup> [http://inspire.jrc.ec.europa.eu/reports/inspire\\_extended\\_impact\\_assessment.pdf](http://inspire.jrc.ec.europa.eu/reports/inspire_extended_impact_assessment.pdf)

<sup>25</sup> The Socio-Economic Impact of the Spatial Data Infrastructure of Catalonia, EUR23300 (2008)

<sup>26</sup> Advanced Regional SDI in Europe: Comparative cost-benefit evaluation and impact assessment perspectives, International Journal of Spatial Data Infrastructures Research, 2010, Vol.5, 145-167



authorities published a detailed analysis of the impacts of the INSPIRE Directive for the provinces in The Netherlands.

- In Catalonia (7 million inhabitants) the total investment of EUR 1.5 million to set up the spatial data infrastructure and to develop it over a four-year period (2002-2005) was recovered in just over 6 months. The main benefits of the infrastructure accrue at the level of local public administration through internal efficiency benefits (time saved in internal queries by technical staff, time saved in attending queries by the public, time saved in internal processes) and effectiveness benefits (time saved by the public and by companies in dealing with public administration).
- Lombardy (more than 10 million inhabitants) invested EUR 4 million in setting up a spatial data infrastructure during three years (2004-2006). Whereas the Catalonia study (see above) focused on the internal benefits, the Lombardy study focused on the external benefits in particular for private sector firms active in the field of Environmental Impact Assessment (EIA) and Strategic Environmental Assessment (SEA). The existence of the SDI in Lombardy had a positive impact on finding and accessing the data needed for EIAs and SEAs, i.e. average savings of 11% in cost and 17% in time. This resulted in net benefits to the companies of approximately EUR 3 million per year in this application domain alone. Moreover, a wider social benefit was identified, i.e. that the use of the same data and knowledge between developers and regulators facilitates the dialogue between the two and results in more effective management of the regional development process.
- The Dutch impact analysis<sup>27</sup> of INSPIRE concludes that the implementation of the Directive offers important opportunities to streamline the geo-information sources within the nation. “At first glance the advantages of INSPIRE mainly concern cross-border transnational issues. However, INSPIRE also brings the advantage of standardisation and professionalising geospatial services within the Netherlands. It improves the cooperation between provincial and national authorities and between the authorities of the different provinces” and “We also see opportunities for third-party use of geo-information: geospatial information of the Dutch water authorities and our neighbouring countries is becoming easily accessible for the provinces.”

These results from specific regional ex-post evaluations confirm the orders of magnitude of the economic benefits presented in Table 2.

Based on close cooperation between the Environment DG, Eurostat and the JRC, the Commission has been investing in INSPIRE around EUR 2.8 million per year over the last seven years. The JRC’s impact comes through the close cooperation within the Commission and with the relevant bodies in the Member States, which in turn make significant investments in local, regional

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<sup>27</sup> “INSPIRE begint vandaag”, Impact analysis for the Dutch provinces published by the Interprovinciaal Overleg (IPO), June 2009, IPO publication number 283

and national SDIs, estimated at around EUR 100 million per year. The yearly economic benefits are estimated around 10 times these costs, but importantly qualitative improvements in terms of data availability, accuracy and speed of delivery have a positive impact on the functioning of public services and benefit the citizens.

### **4.3 Euratom On-Site Laboratories**

#### **4.3.1 Background**

The JRC dedicates 25-30% of its resources to specific tasks for the safety and security of the use of nuclear energy in the EU. The tasks concern: promoting research through an in-house nuclear research programme, ensuring the dissemination of technical information and contributing to a comprehensive and strict system of nuclear safeguards to prevent that nuclear materials are diverted from their intended use.

These tasks date back to the creation of the JRC under the Euratom Treaty of 1957 and they are highly important still today, when 143 nuclear reactors in the EU provide about 14% of the total primary energy needs. They account for roughly 30% of the total electricity production in the EU<sup>28</sup>.

To produce electricity nuclear power plants use the same fission process that is used in nuclear weapons to produce explosions. Hence, the risk of nuclear proliferation is inherent to the use of nuclear energy. The principal risks of nuclear proliferation come from the technical characteristics of the nuclear fuel cycle<sup>29</sup>, especially at the very sensitive step of reprocessing irradiated fuel.

The only way to know whether nuclear material is diverted from its intended use is through a strict system of nuclear material accounting and control (safeguards) at reprocessing plants in the EU. By accurately determining the quantities of uranium and plutonium the verification measures are capable to identify that nuclear material is missing with a high probability and in a timely fashion.

In the European Union, nuclear material from irradiated reactor fuel is reprocessed at two sites – La Hague in France and Sellafield in the United Kingdom. These are the largest nuclear sites within the EU, processing 2000 tonnes of nuclear material per year, which represents 80% of the world's reprocessed spent nuclear fuel.

A thorough analysis in the early 1990s of the options to perform nuclear material accountancy at these reprocessing plants confirmed that sampling of

<sup>28</sup> Eurostat Statistical Books - Energy, Edition 2010, ISSN 1830-7833

<sup>29</sup> The nuclear fuel cycle is formed by the various activities associated with the production of electricity from nuclear reactions. It starts with the mining of uranium and ends with the disposal of nuclear waste. With the reprocessing of used fuel, the stages form a true cycle.

material from the process streams would be required. However, transport of the samples to a central Euratom laboratory should be avoided for reasons of time, money and safety. To verify the flow of nuclear material at both plants<sup>30</sup> the JRC opened On-Site Laboratories respectively in Sellafield (1999) and La Hague (2000) on behalf of the Commission's Safeguards Directorate at the Energy DG in Luxembourg.

JRC analysts are present at the On-Site Laboratories for more than 40 weeks per year, making on average 800 sample analyses per year, based on which Euratom inspectors from the Energy DG do their nuclear accountancy. The analyses performed allow Euratom inspectors to check, independently of the plant operator, the fissile material chain and inventory of these facilities to assure that the nuclear material is only used for declared, peaceful purposes.

#### **4.3.2 Impact and benefits**

Literature on the impact of nuclear safeguards is scarce. However, safeguards approaches for the once-through fuel cycle are well-known and generally considered effective. Safeguarding spent-fuel reprocessing is relatively expensive and technically challenging<sup>31</sup>. The JRC's On-Site Laboratories have proved to be an essential part of the safeguards measures at both reprocessing plants.

In this perspective perhaps the most important benefit of the On-Site Laboratory is that its nuclear safeguards facilitate the establishment of a detailed account of the nuclear materials operations of the reprocessing plants and give assurance to governments and the public. This assurance concerns that the European nuclear industry, the European Union and its Member States comply with their legal duties under the Euratom Treaty and their commitments to the Non-Proliferation Treaty.

Further benefits are that the JRC's On-Site Laboratories optimise the logistics for sample analysis and reduce costs and safety risks associated with transport of nuclear material.

The political and societal benefits from the On-Site Laboratory demonstrate the effectiveness and efficiency of the successful technological development by the JRC. The International Atomic Energy Agency (IAEA) and the Japanese Nuclear Material Control Centre have underlined this further by installing a similar On-Site Laboratory as an important part of safeguards at the Rokkashomura reprocessing plant in Japan.

<sup>30</sup> The Euratom Safeguards On-Site Laboratories at the Reprocessing Plants of La Hague and Sellafield, JRC reference report 2010, EUR 24602 EN, ISBN 978-92-79-18647-9

<sup>31</sup> Non-proliferation Impact Assessment (NPIA), US National Nuclear Security Administration [http://nnsa.energy.gov/sites/default/files/nnsa/inlinefiles/GNEP\\_NPIA.pdf](http://nnsa.energy.gov/sites/default/files/nnsa/inlinefiles/GNEP_NPIA.pdf)

#### 4.4 Reference materials, standards and measurements

The JRC is an important producer of reference materials and developer of standards and measurements for application in a wide variety of sectors like: food and feed safety, environmental monitoring, chemical metrology, biotechnology, life science, radiation protection, nuclear safety and security. In particular, standards and standardisation are very effective policy tools<sup>32</sup> for the industry and competitiveness of the EU. The mere existence of standards is trade-enhancing and econometric studies have established a clear macro-economic connection between standardisation in the economy, productivity growth, trade and overall economic growth<sup>33</sup>.

Through its activities in the area of reference materials, standardisation and measurements the JRC has the position of European (metrology) reference centre and participates in European standardisation bodies like CEN/CENELEC<sup>34</sup>, in the activities of the international metrology organisations like the International Committee for Weights and Measures (CIPM).

Worldwide in this field of standards and measurements the JRC takes a strong position comparable in many aspects to the National Institute for Standards and Technology (NIST) in the United States.

Since NIST has conducted a relatively large number of impact studies covering a wide range of technologies and industries, international comparison in this area can shed some light on JRC's impact. NIST presents these studies collectively as an indicator of past and potential economic impacts and the economic importance of the area. They conclude on an average cost-benefit ratio of 1:47 of its reference, standards and measurement programmes<sup>35</sup>.

The JRC and NIST have similar standard and reference activities in areas like food quality and safety, genetically modified food and feed, toxicity testing, clinical chemistry, nuclear safeguards, nanomaterials or energy. Hence, impact results elaborated by NIST can be taken as a reliable indicator for the value of JRC work in these areas.

The JRC has not yet made quantitative analysis of its standard and reference work in terms of economic impact, but the following two narratives come from the JRC's rich history of standards, reference materials and measurements: one demonstrating significant economic savings realised in the BSE test standard and one describing JRC's chocolate test method becoming a world standard.

<sup>32</sup> Executive summary of the impact assessment accompanying the document Proposal for a Regulation of the European Parliament and of the Council on European Standardisation SEC(2011) 672

<sup>33</sup> CEN (European Committee for Standardisation) and CENELEC (European Committee for Electrotechnical Standardisation)

<sup>34</sup> CEN (European Committee for Standardisation) and CENELEC (European Committee for Electrotechnical Standardisation)

<sup>35</sup> <http://www.nist.gov/director/planning/summary-studies.cfm> Summary of NIST Laboratory Economic Impact Studies. From 2000-2011, NIST conducted sixteen economic impact studies of research programmes, which produced cost-benefit ratios ranging from 1:4 to 1:249. The average benefit-cost ratio of 1:47

#### **4.4.1 BSE tests**

The JRC involvement in the resolution of the BSE crisis is one of the examples to illustrate the multidimensional role of the organisation: as producer of reference materials, as biotechnological and above all neutral expert, and as a European reference centre in an international crisis.

When BSE first occurred in the mid 1990s, it resulted in a widespread scare amongst consumers. Beef consumption in the EU-15 – estimated before at around seven million tonnes per year – decreased by 10% because of the loss of confidence in food safety among consumers, a drop of some 1.5 million tonnes of beef with an economic value of several billion euros. Only in 2002, after the introduction of efficient testing, did beef consumption restore to the level of 1995.

To remedy the situation, European and national legislation was introduced through Regulation (EC) No 999/2001, which required mandatory testing of cattle older than 30 months. In 2002, this resulted in about 6-7 million BSE tests, rising later to about 11 million tests per year.

Confidence in test results was critical not only for food safety reasons but in particular to restore confidence amongst consumers. Various research groups at national or international level had been developing tests since the middle of the nineties and later on different companies produced and commercialised these tests. However, it was important to establish independently that the tests worked reliably. In Europe there was not a single metrology institute or a metrology research programme able to cope with this issue. Therefore the Commission's Health and Consumers DG asked the JRC to take the lead and combine its metrology research programme with that of other competent research laboratories.

Over many years the JRC had built up expertise in bio-analysis as well as in the safe handling and processing of hazardous materials (e.g. handling of nuclear materials in glove boxes). Hence, the JRC could organise an independent evaluation of some twenty commercially available tests using specially developed blind test samples. This led to the approval of twelve tests. Some 7000 reference materials for quality control were individually prepared and distributed amongst EU national reference laboratories and a novel reference material was designed, based on BSE infected transgenic mouse brain. The performance of national reference laboratories was benchmarked using these newly developed tools.

Through this procedure the JRC introduced competition among BSE test providers, which led to lower prices of the test. Consequently the EU subsidy could drop from 20 to 7 euro per test kit. A very conservative estimate of the accumulated direct saving because of this price drop is about EUR 250 million in the period 2002-2006 (only the cost of the test was considered). The corresponding cost of the JRC effort was about EUR 1 million, thus resulting in a

cost-benefit ratio of 1:250, disregarding the benefit from the recovery of the beef market.

#### 4.4.2 The Chocolate Directive

Another illustration of a successful role in standardisation concerns the Chocolate Directive/2000/36/EC, which allows the use of up to 5% of a limited number of vegetable fats (i.e. cocoa butter equivalents or CBE) in the production of chocolate. Council and European Parliament adopted the Directive in the year 2000 after more than twenty-five years of negotiation, finally creating a single market for chocolate whilst recognising the different traditions of making chocolate in Europe. Member States implemented the Directive as of 2003.

A directive like the Chocolate Directive basically is about food labelling: when does a substance deserve the label “chocolate” and when does it not? Standardised labelling should benefit the internal market. It aims at stimulating the competition, but from time to time it can also limit competition. For example, if only chocolate made from purely cocoa butter was allowed, it would exclude all competition from chocolate producers who make chocolate with other vegetable fats. Vice versa, if EU legislation would allow the use of other fats, then these chocolate producers would be permitted to sell their products as chocolate in all the EU countries.

Therefore, the setting of food standards is associated with major economic interests. Manufacturers attempt to lobby for their sake and influence their respective national government, the Commission and the European Parliament. Regarding chocolate business, the EU-27 had an average annual consumption of 6.3 kg of chocolate products per capita in 2008 and imported around 2 million tonnes of cocoa beans, processed cocoa products (cocoa paste, butter and powder) and chocolate<sup>36</sup>. Together this represents in total around EUR 4 billion in economic value.

In complex policy processes like this the JRC keeps an eye on the technical feasibility to enforce the legislation, which in the case of chocolate was not possible at the time since vegetable fats are difficult to quantify or detect due to their chemical composition and physical properties resembling those of cocoa butter.

For the Chocolate Directive the JRC developed the standard that specifies a validated procedure for the quantification of CBE in cocoa butter and plain chocolate<sup>37</sup> and eventually wrote the analytical method into the directive. For compulsory use in this standard the JRC also developed the cocoa butter Certified Reference Material (IRMM 801) to calibrate test systems, to check the

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<sup>36</sup> Source: Eurostat

<sup>37</sup> Method Description for the Quantification of Cocoa Butter Equivalents in Cocoa Butter and Plain Chocolate, publication EUR 20831 EN, 2003

system's suitability and to ensure high comparability of the results between individual testing laboratories. This example underlines the long-term implications of JRC's work in the area of standards and measurement, because six years after the filing of the standard and as recent as in 2009 the JRC's standard became an ISO world standard for chocolate<sup>38</sup>.

There are many such cases in which the JRC directly or indirectly establishes the methods of analysis to monitor compliance. These methods often have to be much more accurate than existing ones and once accepted by all Member States these methods are incorporated into appropriate legislation.

The development of the verification method for a directive takes place behind the scenes of the political discussions, but it is the key enabling factor for the implementation of the directive and as such the capitalisation of concrete European added value from the JRC. The associated impact is very broad and has:

- technical impact (test method)
- economic impact (favourable cost benefit ratios: often huge economic stakes regulated on the basis of relatively modest JRC investments - of the order of laboratory equipment and several person-years)
- intangible impact (food safety, consumer confidence, training of persons)

## **4.5 EU legislation on Deposit Guarantee Schemes**

### **4.5.1 Background**

Deposit Guarantee Schemes (DGS) reimburse a limited amount of deposits to depositors whose bank has failed. Deposit Guarantee Schemes protect (a part of) the depositor's wealth from bank failures and it reduces the risk of mass cash withdrawals in times of financial instability. Since 1994, the Deposit Guarantee Schemes Directive 94/19/EC obliges EU Member States to have a safety net in place for depositors should a bank on their territory fail to pay.

Primarily, the national supervisory authorities - largely harmonised throughout the EU - exist to prevent bank failures. If nevertheless a bank fails, Deposit Guarantee Schemes step in and reimburse depositors up to a certain ceiling. The existence of these guarantee schemes also means that most depositors (those who are fully covered) do not have to participate in lengthy insolvency procedures, which usually lead to payments that only represent a fraction of the original claims.

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<sup>38</sup> ISO 11053:2009 specifies a procedure for the detection and quantification of cocoa butter equivalents (CBEs) and milk fat in milk chocolate by triacylglycerol profiling using high-resolution capillary gas-liquid chromatography, and subsequent data evaluation by simple and partial least-squares regression analysis. CBE admixtures can be detected at a minimum level of 0.5 g CBE/100g milk chocolate and quantified at a level of 5 % mass fraction CBE addition to milk chocolate with a predicted error of 0.7 g CBE/100 g milk chocolate.



The 2008 financial crisis demonstrated the weaknesses of the DGS in the Member States and that depositors' money needs to be protected in a more efficient manner. Despite the existence of the EU Directive, during the 2008 financial crisis a depositor with EUR 50 000 on a bank account in France would have received the entire amount in case of the bank's default, whereas a depositor in Spain would have received only EUR 20 000. Considering that some Member States had no reserve funds whatsoever, problems could have become even worse.

Following the financial crisis, the European Commission agreed that the existing fragmented system of DGS could not deliver on the objectives set by the Directive in terms of ensuring depositors' confidence and maintaining financial stability in times of economic distress. As a response, the EU Council agreed that it was a priority to restore confidence in the financial sector and asked the Commission to review Directive 94/19/EC on DGS.

Because of the fruitful partnership constellation with the Internal Market and Services DG allowing fast implementation of support, the JRC helped preparing the proposal by assessing the impact of alternative policy options from different stakeholders' perspectives. The quantitative results of the JRC report<sup>39</sup> were used to set new harmonised rules for deposit protection in the Commission proposal.

#### **4.5.2 The JRC and the Deposit Guarantee Schemes Directive**

The JRC has been studying the effectiveness of Deposit Guarantee Schemes since 2005 and submitted a number of reports on this to the Internal Market and Services DG. The original motivation for preparing these reports came from the need in the Internal Market and Services DG to monitor the situation in the banking sector. However, during the financial crisis the Commission needed more reliable information and it was clear that in depth investigations were needed for the conception of more effective regulation in the field of deposit protection.

Hence the JRC started to collect the appropriate information in cooperation with the European Forum of Deposits Insurers (EFDI), an international organisation representing the Deposit Guarantee Schemes from all Member States. Through this forum the JRC could access the DGS in the Member States, organise various surveys and build a set of common definitions to harmonise the collected information in order to build a comprehensive and suitable dataset for the analyses. The subsequent stream of work for the DGS shows three main achievements.

1. Related to the Amendment to the Directive and adopted as an emergency measure in the middle of the financial crisis. This Amendment increased the

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<sup>39</sup> JRC Report under Article 12 of Directive 94/19/EC as amended by Directive 2009/14/EC - 2010



minimum level of coverage to EUR 50 000 and after one year to at least EUR 100 000. The decision of the level of coverage was based amongst others on economic calculations in a JRC ad-hoc study<sup>40</sup>.

2. Related to the broader revision of the Directive on DGS, which started in 2009 and concluded with the adoption of a new legislative proposal by the Commission in July 2010. The Internal Market and Services DG made use of the JRC's competence and its access to knowledge and expertise in this field to prepare this proposal for new legislation based on solid quantitative elements. Using data collected among Member States, the JRC made an analysis of the workings of deposit protection in the EU and made an impact assessment of the introduction of new regulations for an extensive number of scenarios, covering a wide range of deposit protection issues. In essence the JRC prepared the Impact Assessment that accompanied the Commission proposal for the revised Directive.
3. Related to the estimation of DGS premia based on banks' risk profiles. The JRC provided its expertise in modelling to investigate possible approaches, delivered two studies on this topic and developed the statistical model that the Commission included in its proposal. This reflects methodologies already adopted in some of the Member States.

In cooperation with academia, the JRC has also started a new line of research to develop a completely new approach to assess the probability and magnitude of banking crises. This model, named SYMBOL (SYstemic Model of Banking Originated Losses), links the amount of capital set aside by banks following the Basel Accord with other safety net tools such as the Deposit Guarantee Schemes. The European Commission uses SYMBOL to corroborate the target levels for Deposit Guarantee Schemes funds. The model is currently being used for the preparation of new banking regulations such as the European framework for bank recovery and resolution.

#### **4.5.3 Impact and benefits associated with the Directive**

The new DGS Directive aims to harmonise the situation in the Member States with the following more relevant impacts, mentioned in the proposal:

- Simplification and harmonisation of the scope of coverage. Only deposits by customers and by non-financial corporations would be eligible for protection in all MS and deposits would be reimbursed up to EUR 100 000. This means that around 30 million more deposits would be fully protected.
- Reduction of the payout deadline to seven days. In case of default, the DGS would have to repay depositors within a certain time horizon. The

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<sup>40</sup> JRC Scientific and Technical Reports, Change in the DGS level of coverage due to the 2008 financial crisis: first basic impact evaluation, EUR 23673, ISBN 978-92-79-11093-1, (2008)

proposal would reduce the maximum payout deadline from 20 days to 7 days from the declaration of default. This faster procedure should avoid runs on banks and reduce further negative effects on financial stability.

- Harmonisation of the financing mechanisms of DGS. All DGS would have to move to an ex-ante funding system, because this system is better capitalised and hence seems to be more adequate to reimburse depositors when banks fail than an ex-post system, as also suggested by the “de Larosière Report”<sup>41</sup>. Moreover, the proposal sets a target level for DGS funds, calibrated on collected information on occurred DGS payouts and government interventions in the last financial crisis. The scope of moving to a well-capitalised system of DGS is to avoid public finances to cover costs of banks’ defaults and, ultimately, to protect citizens’ money.
- Introduction of risk-based elements for bank contributions to DGS funds. Most DGS currently calculate banks’ contributions using only data on the amount of protected deposits, without including any information on the risk profile of banks. According to the proposal, contributions that each bank has to pay to the DGS would be calculated based on several risk indicators, in order to better reflect the creditworthiness of credit institutions.

As of 2007 the total amount in deposits that is eligible for protection under Deposit Guarantee Schemes in the EU is of the order of EUR 9.3 trillion and the corresponding amount of covered deposits is around EUR 5.7 trillion. If the Directive was fully implemented (i.e., if the level of coverage was increased to EUR 100 000), then the amount of covered deposits would increase to around EUR 6.7 trillion.

By carrying out the necessary inquiries in the Member States and preparing the underlying impact assessment the JRC made a key contribution to the preparation and the accomplishment of this new Deposit Guarantee Schemes Directive. This case study demonstrates the JRC’s capacity to operate independent of national interests through a partnership constellation and how in-house advice enables the Commission to act quickly in defence of EU citizens’ interest.

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<sup>41</sup> Report of the High-level Group on Financial Supervision in the EU, chaired by Jacques de Larosière, 2009

## 5 THE JRC'S ECONOMIC IMPACT

Customary advocacy for the JRC refers to its effective scientific support to EU policies, its expertise in nuclear safety and security, its excellence in measurements and testing, or its leading-edge reports for instance on biofuels, genetically modified crops or its frequently quoted industrial scoreboard. The JRC's work is rarely associated with its economic impact or its positive leverage.

These factors have been established for a number of JRC activities in Chapter 4, and it would be effective to have one indicator for the economic impact or one number for the return on investment of the JRC. Although it is possible to draw overall general conclusions based on a systematic series of returns on investment and cost-benefit ratios of individual programmes or projects, the economic impact of an organisation like the JRC has yet to be calculated. Nevertheless, this chapter tries to develop some idea about the JRC's impact in the economy by looking at the economic impact of research and technology organisations (RTO) in Europe, albeit literature on this subject is scarce.

### 5.1 Research and technology organisations in Europe

Europe's RTO family is a heterogeneous group of several hundreds of organisations<sup>42</sup>. As to their size, they employ from several tens of staff to well over ten thousand staff. The geographical focus of the individual RTO goes from local, regional and national to indeed a European focus for the JRC. RTOs fulfil a variety of functions. In 2005 the European Research Advisory Board (EURAB) analysed the RTOs in Europe and the report identified<sup>43</sup> their five characteristic functions:

- Research (fundamental/target-oriented/strategic)
- Technological support to economic development
- Supporting public policy
- Technical norms, standards
- Constructing, operating and maintaining key facilities

Whereas small-sized RTOs often specialise in one or two of these functions, the larger size<sup>44</sup> RTOs employ all of these functions, although the relative importance between the functions may differ from one organisation to another. The JRC exercises these five functions on behalf of the Commission and can therefore usefully be compared and considered as "part of the sector". Its impact is part of the total impact of the RTO sector.

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<sup>42</sup> Assembled in the European Association of Research and Technology Organisations (EARTO) with more than 350 RTO members across Europe

<sup>43</sup> [http://ec.europa.eu/research/eurab/pdf/eurab\\_05\\_037\\_wg4fr\\_dec2005\\_en.pdf](http://ec.europa.eu/research/eurab/pdf/eurab_05_037_wg4fr_dec2005_en.pdf)

<sup>44</sup> EARTO grouped the larger RTOs under "EuroTech"

Little was known about this impact of the RTO sector, until recently when the European Association of Research and Technology Organisations (EARTO) published the first European-wide impact study<sup>45</sup>. This study, sampling 275 RTOs, demonstrates that they are key actors in the European innovation system. With a combined annual turnover of around EUR 20 billion they generate a substantial economic impact estimated to total at EUR 40 - 50 billion – and up to EUR 100 billion when cumulative social returns are taken into account. The report also exposes the RTOs’ importance in tackling key societal challenges and their substantial contribution to economic competitiveness in Europe.

5.2 Economic impact

The EARTO study presents numbers for the overall economic impact of RTOs demonstrating their collective force in European innovation (Table 3). The estimates in the study are subject to large uncertainties, but the overall estimated short-term economic impact of European RTOs is considered to be in the range of at least EUR 25 - 40 billion per year.

Economic impact RTOs in the EU (turnover: EUR 18.5 - 23 billion)	
<i>Estimate, incl. only short-term effects</i>	EUR 25 - 40 billion
<i>Estimate incl. long-term effects</i>	>EUR 100 billion

Table 3. Economic impact estimates based on the EARTO report (ref. 45)

According to the study, the applied model (restricted to short-term impact) and the numbers represent a considerable underestimate. For instance, a longer time horizon for returns on R&D would easily double the impact to at least EUR 100 billion per year.

Representing about 1.5% of the total turnover of the 275 RTOs in Europe sampled in the report, the JRC belongs to a group of larger RTOs with its specific position at the service of Europe. A proportional estimate for the JRC’s long-term overall economic impact would come out well above EUR 1.5 billion annually. The Steering Group recommended considering this estimate with caution given the special profile and the European dimension of the JRC and being familiar with the inhomogeneity in the sample of RTOs. Through its unique and wide geographic focus, the economic consequences of the JRC’s achievements reach a European and often international scale. Some of the elaborated cases in Chapter 4 of this report identify such achievements and indicate economic impacts well beyond the proportional estimate that could be derived from the EARTO study.

Over and above this, the Steering Group stressed the huge importance of the JRC’s impact on intangible assets of the EU (enhanced human capital, knowl-

<sup>45</sup> Impacts of European RTOs: A study of Social and Economic Impacts of Research and Technology Organisations, October 2010

edge creation and sharing, competitiveness through setting world standards, scientific knowledge into policy decision).

Therefore, rather than giving numbers for the economic impact of the JRC, the conclusion is that cost benefit ratios for the JRC are favourable and that its return on investment is sizeable and significant.



## 6 THE JRC AND EUROPE 2020

### 6.1 Future impacts of JRC activities

The past impacts and results presented in the previous chapters are positive indicators for the JRC's effectiveness in the European policy-making and implementation process. They are the basis for a prospective analysis, making projections into the future. Hence, the report concludes with an examination of JRC impacts following an incremental scenario:

- with a baseline consisting of impacts from continued institutional support activities,
- an increasing demand for introducing science into policy making in the coming years
- supplemented impacts from a number of reorientations and new activities in response to changing political priorities,
- plus cumulative effects from necessary responses to unforeseeable crises or sudden events.

The baseline for future impacts is an effective continuation of policy support from the 2007-2013 to the 2014-2020 budgetary time frames. These impacts are an extrapolation from the situation today in which JRC deliverables sort their effect in policy areas where science plays a particular role, i.e. in areas involving people's health, people's safety, the environment and the competitiveness of the European economy. In this extrapolation the constellation of "science sensitive" policies (environment, climate change, energy, transport, health, agriculture, ICT, industry etc.) is at least stable with the possibility of an increasing demand for introducing science into policy making in the coming years, while the JRC keeps its expertise and capabilities and the fruitful interaction between the JRC and the policies continues. The result for the Horizon 2020 Common Strategic Framework will be that the JRC continues to generate impacts as described in the previous part of the report.

Regarding changing priorities, the Commission adopted the "Europe 2020" strategy<sup>1</sup> and put forward the seven flagship initiatives to catalyse progress in sustainable, smart and inclusive growth. This represents a key change in the political environment within which the JRC operates, which brings the question how the new policy context affects the JRC and where its output will generate impact in the future. The next section addresses these impacts in the new policy context with the implementation of the Europe 2020 strategy to which the JRC will respond effectively. It also includes some reflection on the effects from necessary responses to unforeseeable crises or sudden events.

## 6.2 The JRC in Europe 2020 and beyond

Where will the JRC be able to generate further impact in the new policy context of the “Europe 2020” strategy? To answer this question, the JRC’s impacts from the six thematic evaluation sectors (cf. Chapter 3.2 and Annex 2) in 2010 have been analysed in the perspective of the seven flagship initiatives. Figure 4 is a result of this analysis and presents a mapping of the impacts. If there is little or no overlap between JRC activities in the thematic sector and the flagship concerned, then there is no impact expected and the grid point in the map has no marker. In the other situations the grid points have an impact marker in a dark or a light blue colour distinguishing two cases, respectively “impact established” and “impact expected”.

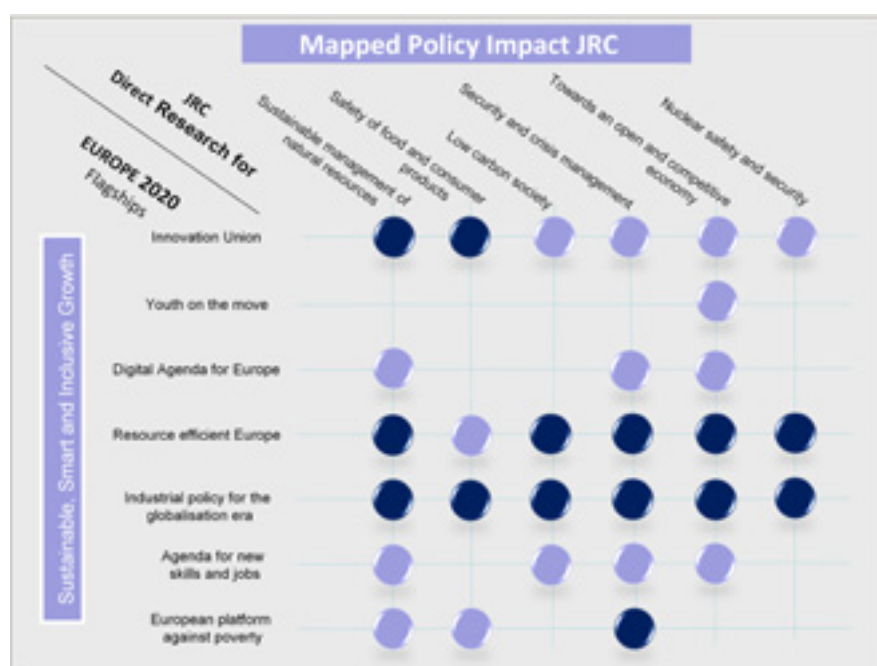


Figure 4. Mapped policy impacts from the six thematic evaluation sectors (vertical) on the Europe 2020 flagship initiatives (horizontal). A dark blue marker indicates established impact in ongoing activities and a light blue marker indicates that impacts are expected from continuing, planned and new activities in the JRC programme. The main text explains this in more detail.

These two situations for the policy impact are distinguished as follows:

- “Impact established” (dark blue marker): relevant impacts have been identified in the execution of the 2010 programme. This concerns many activities that belong to the JRC’s permanent support to EU policies at different stages of the policy cycle and continued impact on the Europe 2020 flagships is to be expected.
- “Impact expected” (light blue marker): this relates to impacts supporting new policy priorities that were not incorporated in the original JRC programmes. These expected impacts will be partially due to adaptations in the programme, serving the new political priorities by refocusing



of existing capacity. Partially they will also come from ongoing institutional support originally conceived for other purposes. For instance, support for the INSPIRE directive (Chapter 4.2) contributes to flagships “resource efficiency” and “industrial policy” because it is conceived with a focus on environmental and standardisation aspects. However, outside this focus, INSPIRE will also help bringing down key barriers defined in the Digital Agenda, and with new services it will contribute to the flagships for the Innovation Union and the Agenda for new skills and jobs.

The third cumulative level concerns effects from responses to unforeseeable crises or sudden events, which will inevitably occur in the Europe 2020 time frame. The JRC has a proven record of effective adaptations and responses to such situations and within its competence and possibilities it will do the necessary in the future by acquiring new capabilities or external expertise that can be mobilised to support.

One example of such flexible response is the support provided for the preparation of the new Deposit Guarantee Schemes Directive following the financial crisis in 2008 (Chapter 4.5). In the wake of this the JRC could even have to strengthen its role as internal supplier of scientific and economic analyses for development of policy in line with the Europe 2020 strategy; a development that would open up new avenues and generate further impact in the thematic “competitive economy” sector.

Another more recent example of such quick response is the swift programmatic and organisational adaptation made in the JRC to support an immediate and coordinated EU response to the accident at the Fukushima nuclear power plant, which triggered the urgent need to identify potential further improvements of nuclear safety in the EU.

With this flexibility and preparedness, the JRC is likely to generate new policy impacts from its work, in addition to a series of significant institutional policy impacts mapped out under the Europe 2020 strategy. Furthermore, a new horizon-scanning and anticipation function as well as the capacity for exploratory research should keep the JRC at the forefront of developments in science, policy and society to enable a quick response and an effective operation in the period 2014-2020.

## 7 CONCLUSIONS: EXPERTS' COMMENTARY

The impact analysis has been guided by a Steering Group. According to its mandate and to conclude the analysis, the Group presents its findings and conclusions in the following commentary, which forms an integral part of the report.

1. The impact analysis in this report responds to recommendations from past JRC evaluations to be more factual and to document achievements and successes more explicitly. With the applied methodology the report provides a satisfactory response and the findings confirm that:
  - JRC activities are tightly linked with EU policies and effectively support the introduction of science and scientific knowledge in the policy Directorates General of the Commission;
  - JRC support covers a broad range of policies during conception, development, implementation and monitoring;
  - JRC generates impact largely through the Commission for the benefit of the EU and its Member States collectively and individually.
2. The information collected in the report points to a positive economic impact of the JRC. As indicated by some cost-benefit ratios in the analyses, several activities lead to savings that are considerable compared to their costs. To answer more specific questions in monetary terms, further study and empirical research is necessary. Based on a larger number of such studies, it would be possible to draw more precise conclusions and to quantify the cost-benefit ratios of individual programmes or projects. It is recommended to introduce such impact analyses and cost-benefit studies of specific work as part of the new JRC programme.
3. Several of the case studies in Chapter 4 show that the JRC has the great advantage of being an impartial organisation in a pan-European setting and in a unique position to advise the Commission. Scientific support for policy decisions is needed although science may not have a definite answer to all challenges faced. The JRC plays a key role in several parts of the EU policy processes, bringing significant benefits in areas where there is still scientific or technological uncertainty. As a consequence the Steering Group sees a vital role for the JRC because of
  - its unique European dimension,
  - its impact often for the direct benefit of the EU citizens, and
  - the Commission's need to have in-house access to scientific knowledge and information independent of national and private interests, including in areas where scientific evidence is still inconclusive.
4. To deliver, the JRC has to stay at the forefront of science and technology and develop its knowledge base continuously, to ensure that the best and the

most responsible decisions can emerge in policy areas where science plays a sensitive role. Connections with the scientific community through staff exchange are an important element to achieve this, while it also brings side benefits in training and education.

5. In the view of the Steering Group, the European added value of the JRC's work is rooted in the JRC's pan-European scope and range of action. It gives the JRC a relatively strong weight in its international operations and helps to establish JRC methods as leading examples. To strengthen these effects for the benefit of the competitiveness of the European economy the JRC could usefully enhance cooperation with industry.
6. The JRC can promote stronger integration in the production of knowledge in the EU. In particular the JRC should strive for full data availability and information sharing across academic disciplines, research and technology organisations, governmental bodies, the public and private sectors, and nations around the world, keeping in mind the economic interest of the EU.
7. Having seen the challenges, the support and the impacts, the Steering Group is convinced that the JRC should have the necessary resources to continue delivering on its mission of science support to policies. The Commission, as the largest user of its work will play a particular role and where possible Commission policy Directorates General have to steer JRC's programmes, understanding that science support nowadays no longer works from a deterministic view and cannot produce one-dimensional answers to complex questions.

With this account of its past activities and their impacts the JRC provides a useful underpinning of its role and relevance in "Horizon 2020" the Common Strategic Framework of the European Union for Research and Innovation. To generate further impact it should continue tasks from the past, align activities with the priorities of the Europe 2020 strategy and initiate new ones where necessary. It is also mandatory to identify and discontinue low-impact activities, to give the organisation the necessary flexibility to prepare for new challenges and to react to unforeseen events.



## **ANNEX 1.**

### **COMPOSITION OF THE STEERING GROUP FOR THE IMPACT ANALYSIS**

The Steering Group for the report on the impact analysis of the JRC has been asked to validate the approach and the applied methodology, to accompany the drafting of the report and to formulate an independent commentary to the JRC's findings.

<b><i>Name</i></b>	<b><i>Position</i></b>
Jan DEKKER	Former President of TNO, Netherlands Organisation for Applied Scientific Research; Former President EARTO, European Association of Research and Technology Organisations
Brigitte SERREAULT	Vice-President and deputy Chief Technical Officer EADS Astrium Research and Technology
Lena TSIPOURI	Associate Professor at the University of Athens, Department of Economic Sciences
František PAZDERA	Chairman of the Governing Board of the European Sustainable Nuclear Energy Technology Platform (SNETP) Deputy Director of Power Generation for R&D, CEZ



## **ANNEX 2.**

### **SIX JRC POLICY-IMPACT TABLES**

These impact tables relate to Chapter 3, which also explains the policy impact concept.

The tables contain concise excerpts from detailed impact project-information records.

Each table deals with one of the six evaluation themes given in the heading and followed by a list of the customers of the work. Subsequently each table lists subject areas (n.b. not every specific piece of work) where the impact occurred with specific targets, such as directives, regulations etc.

In reading the table the following should be kept in mind:

- The impacts are different in nature. To derive (the nature of the) concrete impact behind the entries in the tables usually requires consultation of a more detailed internal JRC project monitoring data. The entries do not have any indication on work and resources invested.
- One legislative act can give rise to more than one activity in the JRC and it may have a double entry within one theme (table) or be spread over more than one theme (table). Hence, the number of entries in the impacts column does not necessarily represent the numbers of impact on the specific policy. Multiple impacts related to one impact identifier occur, but are not mentioned. Therefore the number impact identifiers in the second column do not add up to the number of roughly 230 high-score impacts.
- The official policy documents referred to in the tables are often not enough to track JRC work. A statement like “estimates made by the Commission services” is sometimes used and does not show that these estimates come from JRC reports. However, as explained in Chapter 3 for each entry in the impact tables there is a verified and validated link to a JRC deliverable.
- Policy impact tables do not express the “effective” outcome of the JRC work programme in its entirety. For instance, part of the ~15% less tangible-impact work may include important results.
- These policy-impact tables do not include development work of the JRC which will bear fruit in the form of added value for policy makers after 2010.

**Table 1. Sustainable management of natural resources**

<b>Customers</b>	
Agriculture and Rural Development DG Climate Action DG Energy DG Enlargement DG Enterprise and Industry DG Environment DG Development and Cooperation DG - EuropeAid Eurostat Health and Consumers DG Humanitarian Aid & Civil Protection DG Information Society and Media DG	Maritime Affairs and Fisheries DG Regional Policy DG European Environment Agency (EEA) Environment agencies in EU Environmental authorities of MS and CC United Nations (UN) UN Environment Programme (UNEP) Food and Agriculture Organization (FAO) Russian authorities European Committee for Standardization (CEN) International Commission for the Protection of the Danube River
<b>Subject</b>	<b>Impact targets</b>
Air quality incl. reference materials and measurements	<ul style="list-style-type: none"> <li>• Directive 2008/50/EC of the European Parliament and of the Council on ambient air quality and cleaner air for Europe (CAFE)</li> <li>• Directive 2004/107/EC of the European Parliament and of the Council relating to arsenic, cadmium, mercury, nickel and polycyclic aromatic hydrocarbons in ambient air</li> </ul>
Stockholm Convention and its implementation at EU level (Persistent Organic Pollutants)	<ul style="list-style-type: none"> <li>• Regulation (EC) No 850/2004 of the European Parliament and of the Council of 29 April 2004 on persistent organic pollutants and amending Directive 79/117/EEC (POPs)</li> <li>• COM(2001)593 – Community Strategy for Dioxins, Furans and Polychlorinated Biphenyls</li> <li>• COM(2010)562 On the implementation of the Community Strategy for dioxins, furans, and polychlorinated biphenyls (COM(2001)593) – Third progress report</li> </ul>
Water policy, water and groundwater quality, reference materials	<ul style="list-style-type: none"> <li>• Directive 2000/60/EC of the European Parliament and of the Council establishing a framework for Community action in the field of water policy</li> <li>• Directive 2006/118/EC of the European Parliament and of the Council on the protection of groundwater against pollution and deterioration</li> <li>• Directive 2008/105/EC of the European Parliament and of the Council on environmental quality standards in the field of water policy, amending and subsequently repealing Council Directives 82/176/EEC, 83/513/EEC, 84/156/EEC, 84/491/EEC, 86/280/EEC and amending Directive 2000/60/EC of the European Parliament and of the Council</li> </ul>
Water Scarcity and Drought	<ul style="list-style-type: none"> <li>• Directive 2000/60/EC of the European Parliament and of the Council establishing a framework for Community action in the field of water policy</li> <li>• COM(2007)414 - Addressing the challenge of water scarcity and droughts in the European Union</li> </ul>
Eutrophication	<ul style="list-style-type: none"> <li>• Council Directive 91/676/EEC concerning the protection of waters against pollution caused by nitrates from agricultural sources</li> </ul>
Urban Waste Water	<ul style="list-style-type: none"> <li>• Council Directive 91/271/EEC concerning urban waste-water treatment</li> </ul>
Marine environment	<ul style="list-style-type: none"> <li>• Directive 2008/56/EC of the European Parliament and of the Council establishing a framework for community action in the field of marine environmental policy (Marine Strategy Framework Directive)</li> <li>• 2010/477/EU: Commission Decision on criteria and methodological standards on good environmental status of marine waters</li> </ul>
Biodiversity and Nature	<ul style="list-style-type: none"> <li>• COM(2010)4 - Options for an EU vision and target for biodiversity beyond 2010</li> </ul>
Soil (protection, information, reference materials and measurements)	<ul style="list-style-type: none"> <li>• COM(2002)179 - Towards a Thematic Strategy for Soil Protection and subsequently COM(2006)231 - Thematic Strategy for Soil Protection - Follow up</li> </ul>
Forest and natural resources	<ul style="list-style-type: none"> <li>• Major partner of FAO Global Forest Resources Assessment (FRA) process; Final report of FRA 2010</li> <li>• African, Caribbean and Pacific States (ACP) Observatory for Sustainable Development</li> <li>• COM(2008) 645/3: Addressing the challenges of deforestation and forest degradation to tackle climate change and biodiversity loss - Follow-up</li> </ul>
Forest fire protection and prevention -Civil Protection	<ul style="list-style-type: none"> <li>• Council conclusions on prevention of forest fires within the EU (2010)</li> </ul>
Sustainable Consumption and Production and Sustainable Industrial Policy Action Plan	<ul style="list-style-type: none"> <li>• COM(2008)397 on the Sustainable Consumption and Production and Sustainable Industrial Policy Action Plan</li> <li>• COM(2003)0302 - Integrated Product Policy - Building on Environmental Life-Cycle Thinking</li> </ul>



Climate Change; Land Use, Land Use Change and Forestry (LULUCF)	<ul style="list-style-type: none"> <li>• UN Framework Convention on Climate Change (UNFCCC)</li> </ul>
Natural Hazards	<ul style="list-style-type: none"> <li>• Directive 2007/60/EC of the European Parliament and of the Council on the assessment and management of flood risks</li> <li>• COM(2009)147: White paper - Adapting to climate change : towards a European framework for action</li> </ul>
Flood (damages, protection, warning, civil protection)	<ul style="list-style-type: none"> <li>• Council Regulation (EC) No 1212/2002 establishing the European Union Solidarity Fund (EUSF)</li> <li>• Flood Action Plan of the International Commission for the Protection of the Danube River</li> <li>• EU Community Mechanism for international Crisis management (MIC)</li> </ul>
Environmental Information System	<ul style="list-style-type: none"> <li>• COM(2008)46 – Towards a Shared Environmental Information System (SEIS)</li> </ul>
Spatial Data Information (SDI) Infrastructure in Europe	<ul style="list-style-type: none"> <li>• Directive 2007/2/EC of the European Parliament and of the Council establishing an Infrastructure for Spatial Information in the European Community (INSPIRE)</li> <li>• Commission Regulation (EU) 1089/2010 implementing Directive 2007/2/EC</li> </ul>
International SDI initiatives (GEOSS, GMES, UN-SDI, Digital Earth, GSDI, and the African SDI)	<ul style="list-style-type: none"> <li>• Directive 2007/2/EC of the European Parliament and of the Council establishing an Infrastructure for Spatial Information in the European Community (INSPIRE)</li> </ul>
Common Agricultural policy (CAP)	<ul style="list-style-type: none"> <li>• Council Regulation (EC) No 73/2009 establishing common rules for direct support schemes for farmers under the common agricultural policy and establishing certain support schemes for farmers, amending Regulations (EC) No 1290/2005, (EC) No 247/2006, (EC) No 378/2007 and repealing Regulation (EC) No 1782/2003</li> <li>• Commission Regulation (EC) No 795/2004 laying down detailed rules for the implementation of the single payment scheme provided for in Council Regulation (EC) No 1782/2003 establishing common rules for direct support schemes under the common agricultural policy and establishing certain support schemes for farmers</li> <li>• Commission Regulation (EC) No 796/2004 laying down detailed rules for the implementation of cross-compliance, modulation and the integrated administration and control system provided for in of Council Regulation (EC) No 1782/2003 establishing common rules for direct support schemes under the common agricultural policy and establishing certain support schemes for farmers</li> <li>• COM 665/2010 on the application of the Farm Advisory System</li> <li>• Commission Regulation (EC) No 1122/2009 laying down detailed rules for the implementation of Council Regulation (EC) No 73/2009 as regards cross-compliance, modulation and the integrated administration and control system, under the direct support schemes for farmers provided for that Regulation, as well as for the implementation of Council Regulation (EC) No 1234/2007 as regards cross-compliance under the support scheme provided for the wine sector</li> <li>• COM(2010)436 on the implementation of the remote sensing applications and on the use of the financial resources made available to it under Council Regulation (EC) 78/2008</li> </ul>
Agriculture - Genetically Modified (GM) crops: coexistence with conventional crops	<ul style="list-style-type: none"> <li>• 2010/C 200/01, Commission Recommendation of 13 July 2010 on guidelines for the development of national co-existence measures to avoid the unintended presence of GMOs in conventional and organic crops</li> </ul>
Biofuels	<ul style="list-style-type: none"> <li>• COM(2010)811 – Report on indirect land-use change related to biofuels and bioliquids</li> <li>• Directive 2009/30/EC of the European Parliament and of the Council amending Directive 98/70/EC as regards the specification of petrol, diesel and gas-oil and introducing a mechanism to monitor and reduce greenhouse gas emissions and amending Council Directive 1999/32/EC as regards the specification of fuel used by inland waterway vessels and repealing Directive 93/12/EEC</li> </ul>

**Table 2: Safety of food and consumer products**

<b>Customers</b>	
Enterprise and Industry DG Health and Consumers DG Environment DG Agriculture and Rural Development DG European Chemicals Agency - ECHA European Food Safety Authority - EFSA	Member States' official control/analytical laboratories Codex Alimentarius European Committee for Standardization - CEN Organisation for Economic Cooperation and Development - OECD International Organization for Standardization - ISO International Organisation of Vine and Wine
<b>Subject</b>	<b>Impact targets</b>
Protection of animals used for scientific purposes	<ul style="list-style-type: none"> <li>• Directive 2010/63/EU of the European Parliament and of the Council on the protection of animals used for scientific purposes</li> <li>• Council Regulation (EC) 440/2008 laying down test methods pursuant to Regulation (EC) No 1907/2006 of the European Parliament and of the Council on the Registration, Evaluation, Authorisation and Restriction of Chemicals (REACH)</li> <li>• OECD Test Guideline Programme</li> </ul>
Genetically modified food and feed; Official Controls for compliance with Feed and Food law; Reference materials and measurements	<ul style="list-style-type: none"> <li>• Regulation (EC) No 1829/2003 of the European Parliament and of the Council on genetically modified food and feed</li> <li>• Commission Regulation (EC) No 641/2004 on detailed rules for the implementation of Regulation (EC) No 1829/2003 of the European Parliament and of the Council as regards the application for the authorisation of new genetically modified food and feed, the notification of existing products and adventitious or technically unavoidable presence of genetically modified material which has benefited from a favourable risk evaluation</li> <li>• Regulation (EC) No 1830/2003 of the European Parliament and of the Council concerning the traceability and labelling of genetically modified organisms and the traceability of food and feed products produced from genetically modified organisms and amending Directive 2001/18/EC</li> <li>• Regulation (EC) No 882/2004 of the European Parliament and of the Council on official controls performed to ensure the verification of compliance with feed and food law, animal health and animal welfare rules</li> </ul>
Food and feed safety (foodstuff contaminants, sweeteners, polycyclic aromatic hydrocarbons, mycotoxins, heavy metals, reference materials and measurements)	<ul style="list-style-type: none"> <li>• Commission Regulation No (EC) 1881/2006 setting maximum levels for certain contaminants in foodstuffs</li> <li>• Regulation (EC) No 1831/2003 on additives for use in animal nutrition</li> <li>• Regulation (EC) No 882/2004 on official controls performed to ensure the verification of compliance with feed and food law, animal health and animal welfare rules</li> <li>• Commission Regulation (EC) No 1881/2006 setting maximum levels for certain contaminants in foodstuffs</li> <li>• Directive 2002/32/EC of the European Parliament and of the Council on undesirable substances in animal feed - Council statement</li> <li>• Commission Directive 2004/46/EC amending Directive 95/31/EC as regards E 955 sucralose and E 962 salt of aspartame-acesulfame</li> <li>• Directive 2003/115/EC of the European Parliament and of the Council amending Directive 94/35/EC on sweeteners for use in foodstuffs</li> <li>• Commission Regulation (EC) No 333/2007 laying down the methods of sampling and analysis for the official control of the levels of lead, cadmium, mercury, inorganic tin, 3-MCPD and benzo(a)pyrene in foodstuffs</li> <li>• 2005/108/EC : Commission Recommendation on the further investigation into the levels of polycyclic aromatic hydrocarbons in certain foods</li> <li>• Commission Directive 2001/22/EC laying down the sampling methods and the methods of analysis for the official control of the levels of lead, cadmium, mercury and 3-MCPD in foodstuffs</li> <li>• Commission Regulation (EC) No 1430/94 amending Annexes I, II, III and IV of Council Regulation (EEC) No 2377/90 laying down a Community procedure for the establishment of maximum residue limits of veterinary medicinal products in foodstuffs of animal origin</li> <li>• 2003/181/EC: Commission Decision amending Decision 2002/657/EC as regards the setting of minimum required performance limits (MRPLs) for certain residues in food of animal origin</li> <li>• Council Directive 90/496/EEC on nutrition labelling for foodstuffs</li> <li>• Directive 2000/13/EC of the European Parliament and of the Council on the approximation of the laws of the Member States relating to the labelling, presentation and advertising of foodstuffs</li> </ul>
Cosmetic products	<ul style="list-style-type: none"> <li>• Council Directive 76/768/EEC on the approximation of the laws of the Member States relating to cosmetic products - with its regular amendments for the purpose of adaptation to technical progress</li> </ul>
Cross-cutting policy on nanotechnology and nanomaterials	<ul style="list-style-type: none"> <li>• Legislation on chemicals, REACH, consumer products, food, novel food cosmetics, medical devices, biocides</li> </ul>

Textiles	<ul style="list-style-type: none"> <li>• CEN/ISO Standards</li> </ul>
Textile Names and Test Methods	<ul style="list-style-type: none"> <li>• Directive 2008/121/EC of the European Parliament and of the Council on textile names</li> <li>• Directive 96/73/EC of the European Parliament and of the Council on certain methods for the quantitative analysis of binary textile fibre mixtures</li> </ul>
Quality and comparability of analytical results generated by official laboratories	<ul style="list-style-type: none"> <li>• 2002/657/EC: Commission Decision implementing Council Directive 96/23/EC concerning the performance of analytical methods and the interpretation of results</li> </ul>
Controls in the wine sector	<ul style="list-style-type: none"> <li>• Commission Regulation (EC) No 555/2008 laying down detailed rules for implementing Council Regulation (EC) No 479/2008 on the common organisation of the market in wine as regards support programmes, trade with third countries, production potential and on controls in the wine sector</li> </ul>
Obesity related health issues	<ul style="list-style-type: none"> <li>• COM(2007)279: White Paper on a Strategy for Europe on Nutrition, Overweight and Obesity related health issues</li> </ul>
Plastic materials and articles intended to come into contact with foodstuffs	<ul style="list-style-type: none"> <li>• Commission Directive 2002/72/EC relating to plastic materials and articles intended to come into contact with foodstuffs</li> </ul>
Food contact materials	<ul style="list-style-type: none"> <li>• Regulation (EC) No 882/2004 of the European Parliament and of the Council on official controls performed to ensure the verification of compliance with feed and food law, animal health and animal welfare rules</li> </ul>
Chemicals	<ul style="list-style-type: none"> <li>• Regulation (EC) 1907/2006 concerning the Registration, Evaluation, Authorisation and Restriction of Chemicals (REACH), establishing a European Chemicals Agency</li> <li>• Commission Regulation (EU) No 1152/2010 amending, for the purpose of its adaptation to technical progress, Regulation (EC) No 440/2008 laying down test methods pursuant to Regulation (EC) No 1907/2006 of the European Parliament and of the Council on the Registration, Evaluation, Authorisation and Restriction of Chemicals (REACH) Text with EEA relevance</li> </ul>
Biocidal Products	<ul style="list-style-type: none"> <li>• Directive 98/8/EC of the European Parliament and of the Council concerning the placing of biocidal products on the market</li> </ul>
Dangerous chemicals (Classification and labelling, export and import)	<ul style="list-style-type: none"> <li>• Regulation (EC) 1272/2008 on classification, labelling and packaging of substances and mixtures</li> <li>• Regulation (EC) 689/2008 concerning the export and import of dangerous chemicals</li> </ul>
Nanomaterials	<ul style="list-style-type: none"> <li>• COM(2004)338 – Towards a European strategy for nanotechnology</li> <li>• Document SEC(2008)2036 accompanying COM(2008)366 – Regulatory aspects of nanomaterials</li> <li>• Contributions to legislation on chemicals, REACH, consumer products, food, novel food, cosmetics, medical devices, biocides</li> </ul>

**Table 3: Development of a low carbon society**

<b>Customers</b>	
Energy DG Climate Action DG Environment DG Mobility and Transport DG Enterprise and Industry DG Regional Policy DG Trade DG	Research and Innovation DG Economic and Financial Affairs DG Agriculture and Rural Development DG Commissioner for Research, Innovation and Science National reference laboratories International Organization for Standardization (ISO) National Renewable Energy Action Plans (NREAP)
<b>Subject</b>	<b>Impact targets</b>
Energy technologies	<ul style="list-style-type: none"> <li>• COM(2007)723 - A European strategic energy technology plan (SET-plan) - 'Towards a low carbon future' and its Information System (SETIS)</li> </ul>
Renewable energy	<ul style="list-style-type: none"> <li>• Directive 2009/28/EC of the European Parliament and of the Council on the promotion of the use of energy from renewable sources and amending and subsequently repealing Directives 2001/77/EC and 2003/30/EC (NREAP)</li> </ul>
Energy strategy	<ul style="list-style-type: none"> <li>• COM(2010)639 – Energy 2020 A strategy for competitive, sustainable and secure energy</li> </ul>
Energy infrastructure	<ul style="list-style-type: none"> <li>• COM(2010)677 – Energy infrastructure priorities for 2020 and beyond – A Blueprint for an integrated European energy network and its Impact assessment SEC(2010)1396</li> </ul>
Funding of R&D energy programmes from the Emissions Trading Scheme (NER300)	<ul style="list-style-type: none"> <li>• Commission Decision C(2010)7499 laying down criteria and measures for the financing of commercial demonstration projects that aim at the environmentally safe capture and geological storage of CO<sub>2</sub> as well as demonstration projects of innovative renewable energy technologies under the scheme for greenhouse gas emission allowance trading within the Community established by Directive 2003/87/EC and its Impact assessment SEC(2010)1320</li> </ul>
Hydrogen and Fuel Cells Technologies	<ul style="list-style-type: none"> <li>• Regulation (EC) 521/2008 setting up the Fuel Cells and Hydrogen Joint Undertaking</li> <li>• Regulation (EU) 406/2010 on implementing Regulation (EC) 79/2009 on type-approval of hydrogen-powered motor vehicles</li> </ul>
Hydrogen Technologies	<ul style="list-style-type: none"> <li>• ISO (Technical Committee TC197) on ISO standard 26142:2010 “Hydrogen detection apparatus - Stationary applications”</li> </ul>
Energy - Indirect Land Use Change (ILUC) emissions	<ul style="list-style-type: none"> <li>• COM(2010)811 - Report from the Commission on “Indirect land -use change related to biofuels and bioliquids”</li> </ul>
Rural development	<ul style="list-style-type: none"> <li>• Work programme Agriculture and Rural Development DG</li> </ul>
Energy Efficiency and Energy Services Commission Energy Saving Action Plan	<ul style="list-style-type: none"> <li>• Directive 2006/32/EC of the European Parliament and of the Council on energy end-use efficiency and energy services and repealing Council Directive 93/76/EEC</li> </ul>
European Energy Infrastructure Package and Trans-European networks for Electricity	<ul style="list-style-type: none"> <li>• COM(2010)677 – Energy infrastructure priorities for 2020 and beyond - A Blueprint for an integrated European energy network and its Impact assessment SEC(2010)1395</li> </ul>
Energy strategy	<ul style="list-style-type: none"> <li>• Public consultation on the Energy Roadmap launched by the Energy DG in 2010 - Contributions to Issues paper</li> </ul>
International cooperation on energy research.	<ul style="list-style-type: none"> <li>• The Energy Technology Systems Analysis Program (ETSAP), an Implementing Agreement of the International Energy Agency (IEA) - Representation of the European Commission in the Executive Committee</li> </ul>
Biofuels and alternative fuels	<ul style="list-style-type: none"> <li>• Directive 2009/30/EC of the European Parliament and of the Council amending Directive 98/70/EC as regards the specification of petrol, diesel and gas-oil and introducing a mechanism to monitor and reduce greenhouse gas emissions and amending Council Directive 1999/32/EC as regards the specification of fuel used by inland waterway vessels and repealing Directive 93/12/EEC</li> </ul>
Emission Standards for heavy duty engines (EURO VI)	<ul style="list-style-type: none"> <li>• Regulation (EC) No 595/2009 of the European Parliament and of the Council on type-approval of motor vehicles and engines with respect to emissions from heavy duty vehicles (Euro VI) - The technical elements of the procedure to check the in-use emissions of heavy duty vehicles using portable emission measurement systems (PEMS)</li> </ul>
Transport Policy	<ul style="list-style-type: none"> <li>• Contribution to Impact assessment analysis of the White Paper on Transport COM(2009)279/4</li> </ul>
Transport infrastructure - charging policy	<ul style="list-style-type: none"> <li>• COM(2008)436 - Proposal for a Directive of the European Parliament and of the Council amending Directive 1999/62/EC on the charging of heavy goods vehicles for the use of certain infrastructures: Follow-up - Analysis on selected corridors and main impacts of the proposal</li> </ul>
Trans European Network -Transport (TEN-T)	<ul style="list-style-type: none"> <li>• Policy review expert group “Integration of transport policy into TEN-T planning”</li> </ul>

Industrial Emissions	<ul style="list-style-type: none"> <li>• Directive 2010/75/EU of the European Parliament and of the Council on industrial emissions (integrated pollution prevention and control)</li> </ul>
Waste policy, bio-waste management	<ul style="list-style-type: none"> <li>• Directive 2006/12/EC of the European Parliament and of the Council on waste</li> <li>• Directive 2008/98/EC of the European Parliament and of the Council on waste and repealing certain Directives</li> <li>• Commission Proposal COM(2010)576 establishing criteria determining when certain types of scrap metal cease to be waste under Directive 2008/98/EC</li> <li>• COM(2010)235 on future steps in bio-waste management in the European Union</li> </ul>
EU Ecolabel working plan	<ul style="list-style-type: none"> <li>• 3rd Ecolabel Work Plan 2011-2015 for discussion with the European Ecolabel Board and subsequent adoption</li> </ul>
Trade and employment	<ul style="list-style-type: none"> <li>• SEC(2010)1269, "Trade as a driver of prosperity"</li> </ul>
Cohesion policy	<ul style="list-style-type: none"> <li>• Ex Post Evaluation of the European Regional Development Funds in Objectives 1 &amp; 2 for the period 2000-2006 - Work package 8</li> </ul>

**Table 4: Security and crisis management**

<b>Customers</b>	
Mobility and Transport DG Home Affairs DG Environment DG Internal Market and Services DG Enlargement DG External Relations DG Development DG Communication DG Information Society and Media DG Justice, Freedom and Security DG Enterprise and Industry DG Maritime Affairs and Fisheries DG Development and Cooperation DG - EuropeAid	Health and Consumers DG Humanitarian Aid & Civil Protection DG Secretariat General EU Delegation to the African Union (AU) European Food Safety Authority (EFSA) European Centre for Disease Prevention and Control (ECDC) European Agency for the Management of Operational Cooperation at the External Borders (FRONTEX) Council of the European Union World Bank United Nations UNOSAT - UN Institute for Training and Research (UNITAR) Monitoring and Information Centre (MIC)
<b>Subject</b>	<b>Impact targets</b>
Aviation safety	<ul style="list-style-type: none"> <li>• Modifications to the ADREP (Accident/Incident Data Reporting) taxonomy adopted by International Civil Aviation Organisation (ICAO)</li> </ul>
Road safety - Digital tachograph	<ul style="list-style-type: none"> <li>• Council Regulation (EC) No 2135/98 amending Regulation (EEC) No 3821/85 on recording equipment in road transport and Directive 88/599/EEC concerning the application of Regulations (EEC) No 3820/84 and (EEC) No 3821/85</li> </ul>
Critical infrastructure protection	<ul style="list-style-type: none"> <li>• Task-force for establishing a European Reference Centre for Critical Infrastructure Protection (ERN-CIP)</li> </ul>
Radio spectrum policy	<ul style="list-style-type: none"> <li>• COM(2010)471 Proposal for a Decision of the European Parliament and of the Council establishing the first radio spectrum policy programme</li> <li>• 2009/343/EC: Commission Decision amending Decision 2007/131/EC on allowing the use of the radio spectrum for equipment using ultra-wideband technology in a harmonised manner in the Community (notified under document number C(2009)2787(1))</li> </ul>
Border security	<ul style="list-style-type: none"> <li>• COM(2008)68 — Examining the creation of a European border surveillance system (EUROSUR)</li> </ul>
Communication	<ul style="list-style-type: none"> <li>• European Media Monitor (EMM) media monitoring services of the EC and its representations, public version 1.5 million hits/day</li> </ul>
Marine environment	<ul style="list-style-type: none"> <li>• 2010/477/EU: Commission Decision on criteria and methodological standards on good environmental status of marine waters (notified under document C(2010)5956).</li> </ul>
Fisheries (economics, management, Electronic Recording and Reporting Systems, Mediterranean fisheries, Data Collection, Effort regime evaluations)	<ul style="list-style-type: none"> <li>• Council Regulation (EC) No 1224/2009 of 20 November 2009 establishing a Community control system for ensuring compliance with the rules of the common fisheries policy</li> <li>• Council Regulation (EC) No 1967/2006 of 21 December 2006 concerning management measures for the sustainable exploitation of fishery resources in the Mediterranean Sea</li> <li>• COM(2010)241 – Consultation on Fishing Opportunities for 2011</li> <li>• COM(2010)658 – Proposal for a Council Regulation fixing for 2011 the fishing opportunities for certain fish stocks and groups of fish stocks, applicable in EU waters and, for EU vessels, in certain non EU waters</li> <li>• Commission Regulation (EC) No 665/2008 laying down detailed rules for the application of Council Regulation (EC) No 199/2008 concerning the establishment of a Community framework for the collection, management and use of data in the fisheries sector and support for scientific advice regarding the Common Fisheries Policy</li> </ul>
Maritime policy	<ul style="list-style-type: none"> <li>• COM(2009)538 – Towards the integration of maritime surveillance: A common information sharing environment for the EU maritime domain</li> <li>• COM(2010)584 on a Draft Roadmap towards establishing the Common Information Sharing Environment for the surveillance of the EU maritime domain</li> </ul>
Health	<ul style="list-style-type: none"> <li>• 1350/2007/EC: Decision of the European Parliament and of the Council establishing a second programme of Community action in the field of health (2008-13) - Follow-up</li> </ul>
Anti-fraud	<ul style="list-style-type: none"> <li>• Statistical and IT tools against fraud and trade-based money laundering</li> </ul>
Transparent and effective aid (TR-AID)	<ul style="list-style-type: none"> <li>• Working Party on Development Cooperation (CODEF)</li> <li>• Council Working Party on Humanitarian Aid and Food Aid (COHAFA)</li> </ul>

Control of major accident hazards	<ul style="list-style-type: none"> <li>• Commission Proposal COM(2010)781 for a Directive on control of major-accident hazards involving dangerous substances (Seveso III)</li> <li>• Council Directive 96/82/EC (known as Seveso II Directive) on the control of major-accident hazards involving dangerous substances</li> <li>• Directive 2003/105/EC of the European Parliament and of the Council amending Council Directive 96/82/EC on the control of major-accident hazards involving dangerous substances (or Amendment to the Seveso II Directive)</li> </ul>
Air traffic	<ul style="list-style-type: none"> <li>• SEC(2010)533, Economic impacts of the air traffic disruptions in the wake of the Eyjafjallajökull eruption.</li> </ul>
European standards for constructions safety	<ul style="list-style-type: none"> <li>• Harmonization and Development of the Eurocode CEN/BT/WG 206</li> </ul>
Food and feed safety: RFID certification	<ul style="list-style-type: none"> <li>• Council Regulation (EC) No 21/2004 establishing a system for the identification and registration of ovine and caprine animals and amending Regulation (EC) No 1782/2003 and Directives 92/102/EEC and 64/432/EEC</li> <li>• 2006/968/EC: Commission Decision implementing Council Regulation (EC) No 21/2004 as regards guidelines and procedures for the electronic identification of ovine and caprine animals</li> </ul>
Humanitarian aid	<ul style="list-style-type: none"> <li>• Council Regulation (EC) No 1257/96 concerning humanitarian aid</li> <li>• Global Disaster Alert and Coordination System (GDACS)</li> </ul>
Community instrument for stability – crisis management	<ul style="list-style-type: none"> <li>• Regulation (EC) No 1717/2006 of the European Parliament and of the Council establishing an Instrument for Stability</li> <li>• Council Regulation (EC) No 2368/2002 implementing the Kimberley Process certification scheme for the international trade in rough diamonds - Follow-up</li> <li>• Joint tri-lateral declaration signed between the EC, World Bank and UNDP on Post Disaster Needs Assessment (PDNA)</li> </ul>



**Table 5: Towards an open and competitive economy**

<b>Customers</b>	
Internal Market and Services DG Economic and Financial Affairs DG Research and Innovation DG Regional Policy DG Home Affairs DG Climate Action DG Education and Culture DG	Enterprise and Industry DG Information Society and Media DG Agriculture and Rural Development DG Commissioner for Research, Innovation and Science European Environment Agency CEN ISO
<b>Subject</b>	<b>Impact targets</b>
Banking and insurance regulations	<ul style="list-style-type: none"> <li>• SEC(2010)834/2 on “Impact of the Deposit Guarantee Schemes”</li> <li>• White Paper COM(2010)370 on “Insurance Guarantee Schemes” and its Impact Assessment SEC(2010)840</li> </ul>
Growth and Stability Pact monitoring	<ul style="list-style-type: none"> <li>• Joint paper on “Total Factor Productivity method” plus JRC software to estimate Output Gap for Economic and Financial Affairs DG</li> </ul>
Macroeconomic modelling	<ul style="list-style-type: none"> <li>• QUEST, model for macroeconomic policy analysis and research</li> </ul>
European Innovation Scoreboard	<ul style="list-style-type: none"> <li>• COM(2010)546 – Europe 2020 Flagship Initiative Innovation Union and its accompanying document SEC(2010)1161 “A Rationale for action”</li> </ul>
Research and Innovation; Industrial Policy; Competitiveness of EU economy	<ul style="list-style-type: none"> <li>• SEC(2010)1276 “European Competitiveness Report 2010”, accompanying the COM(2010)614 – An Integrated Industrial Policy for the Globalisation Era Putting Competitiveness and Sustainability at Centre Stage</li> </ul>
European Research Area, monitoring and analysis	<ul style="list-style-type: none"> <li>• SEC(2010)1161 on “A Rationale for action” accompanying the Communication COM(2010)546 – Europe 2020 Flagship Initiative Innovation Union</li> </ul>
Foresight activities; Research and innovation	<ul style="list-style-type: none"> <li>• Outcomes of the 29 November 2010 meeting of the European Council</li> </ul>
Europe 2020	<ul style="list-style-type: none"> <li>• COM(2010)546 – Europe 2020 Flagship Initiative Innovation Union</li> </ul>
Immigration Integration	<ul style="list-style-type: none"> <li>• Handbook on Integration for policy-makers and practitioners, Third edition, April 2010, Directorate-General Justice, Freedom and Security</li> </ul>
Regional policy (competitiveness, smart specialisation)	<ul style="list-style-type: none"> <li>• 5th Cohesion report (Regional competitiveness index)</li> <li>• COM(2010)553 – Regional Policy contributing to smart growth in Europe 2020</li> <li>• COM(2010)715 – European Union Strategy for Danube Region</li> </ul>
Education and training	<ul style="list-style-type: none"> <li>• Centre for Research on Lifelong Learning of the European Commission (CRELL)</li> </ul>
Europe 2020: Youth on the Move flagship initiative	<ul style="list-style-type: none"> <li>• SEC(2010)1049 Impact Assessment accompanying COM(2010)478: “Proposal for a Council Recommendation - Youth on the move – promoting the learning mobility of young people”</li> </ul>
Digital Agenda for Europe (EU 2020 Flagship)	<ul style="list-style-type: none"> <li>• COM(2010)546 – Europe 2020 Flagship Initiative Innovation Union</li> <li>• COM(2010)254 – Bank Resolution Funds</li> </ul>
Digital Competitiveness	<ul style="list-style-type: none"> <li>• SEC(2010)627 on “Europe’s Digital Competitiveness Report”</li> </ul>
Information Society (Creative content and innovation)	<ul style="list-style-type: none"> <li>• COM(2010)546 – Europe 2020 Flagship Initiative Innovation Union and its accompanying Document SEC(2010)1161 “A Rationale for action”</li> </ul>
Hydrogen and Fuel Cells Technologies	<ul style="list-style-type: none"> <li>• Regulation (EC) 521/2008 setting up the Fuel Cells and Hydrogen Joint Undertaking</li> </ul>
Renewable energy, biofuels, indirect land use change	<ul style="list-style-type: none"> <li>• COM(2010)811 – Report from the Commission on indirect land-use change related to biofuels and bioliquids</li> </ul>
Industrial products (construction product, pressure equipment, Charpy impact tests)	<ul style="list-style-type: none"> <li>• Council Directive 89/106/EEC on the approximation of laws, regulations and administrative provisions of the Member States relating to construction products</li> <li>• Directive 97/23/EC of the European Parliament and of the Council on the approximation of the laws of the Member States concerning pressure equipment</li> </ul>
Agriculture - Reform of the dairy sector	<ul style="list-style-type: none"> <li>• COM(2010) 728, Proposal for a Regulation of the European Parliament and of the Council amending Council Regulation (EC) No 1234/2007 as regards contractual relations in the milk and milk products sector</li> <li>• COM(2010)727 Report from the Commission “Evolution of the market situation and the consequent conditions for smoothly phasing out the milk quota system”</li> </ul>
Agricultural product quality	<ul style="list-style-type: none"> <li>• COM(2009)234 on Agricultural product quality policy</li> <li>• COM(2010)733, Proposal for a Regulation of the European Parliament and of the Council “on agricultural product quality schemes”</li> </ul>
Soil Conservation and Protection	<ul style="list-style-type: none"> <li>• SEC(2009)1093 The role of European agriculture in climate change mitigation</li> </ul>



Climate policy / mitigation	<ul style="list-style-type: none"> <li>• Directive 2009/29/EC of the European Parliament and of the Council amending Directive 2003/87/EC so as to improve and extend the greenhouse gas emission allowance trading scheme of the Community</li> <li>• COM(2010)265 - Analysis of options to move beyond 20% greenhouse gas emission reductions and assessing the risk of carbon leakage</li> </ul>
Climate change adaptation	<ul style="list-style-type: none"> <li>• European Environmental Agency State of the Environment Report 2010</li> </ul>

**Table 6: Nuclear safety and security**

<b>Customers</b>	
Energy DG Development and Cooperation DG - EuropeAid Trade DG Home Affairs DG Enlargement DG Justice, Freedom and Security DG International Atomic Energy Agency (IAEA) Nuclear Energy Agency (NEA) Energy/Euratom Safeguards Office	EU Authorities competent for emergency response EU Member States Nuclear Safety Regulatory Authorities Turkish Atomic Energy Authority Finnish authorities Dutch authorities Lithuania Safety Authority US Department of Energy
<b>Subject</b>	<b>Impact targets</b>
Instrument for Nuclear Safety Cooperation	<ul style="list-style-type: none"> <li>• Council Regulation (Euratom) No 300/2007 of 19 February 2007 establishing an Instrument for Nuclear Safety Cooperation</li> </ul>
Nuclear Safety (including nuclear installations, support to European harmonisation and standardisation, communication on Operational Experience (OE), support to Member States national regulations, to EU Enlargement policy)	<ul style="list-style-type: none"> <li>• Euratom Treaty (Art. 41-43, Annex V)</li> <li>• Council Directive 2009/71/Euratom of 25 June 2009 establishing a Community framework for the nuclear safety of nuclear installations</li> <li>• Council Conclusions on the need for skills in the nuclear field Brussels, 1 and 2 December 2008</li> <li>• Commission Decision 1999/819/Euratom of 16 November 1999 concerning the accession to the 1994 Convention on Nuclear Safety by the European Atomic Energy Community (Euratom) - Follow - up</li> <li>• European Network for Inspection and Qualification (ENIQ)</li> <li>• IAEA Standards</li> <li>• Instrument for Pre-Accession (IPA) programme</li> </ul>
Environmental radioactivity monitoring	<ul style="list-style-type: none"> <li>• Euratom Treaty (Art. 36)</li> <li>• 2000/473/Euratom: Commission recommendation of 8 June 2000 on the application of Article 36 of the Euratom Treaty concerning the monitoring of the levels of radioactivity in the environment for the purpose of assessing the exposure of the population as a whole (notified under document number C(2000)1299)</li> </ul>
Environmental radioactivity, emergency situation	<ul style="list-style-type: none"> <li>• Euratom Treaty</li> <li>• Decision 2010/398/Euratom on the conclusion of a Memorandum of Understanding between the European Commission and the International Atomic Energy Agency concerning the EURDEP (European Radiological Data Exchange Platform)</li> </ul>
Nuclear Security	<ul style="list-style-type: none"> <li>• Euratom programme</li> <li>• EU Chemical, Biological, Radiological and Nuclear materials action plan</li> <li>• IAEA programme</li> </ul>
Common Foreign and Security Policy (CFSP) Tools	<ul style="list-style-type: none"> <li>• IAEA "Research and Development Programme for Nuclear Verification 2010–2011" - support</li> </ul>
External trade, export control	<ul style="list-style-type: none"> <li>• Council Regulation (EC) No 428/2009 setting up a Community regime for the control of exports, transfer, brokering and transit of dual-use items</li> </ul>
External support in nuclear security	<ul style="list-style-type: none"> <li>• Council Regulation (EC, Euratom) No 99/2000 concerning the provision of assistance to the partner States in Eastern Europe and Central Asia</li> </ul>
Radiological protection	<ul style="list-style-type: none"> <li>• Euratom Treaty (Art. 35)</li> <li>• Instrument for Pre-accession Assistance (IPA) – Turkey</li> </ul>
Nuclear safeguards (Non-Proliferation of Nuclear Weapons)	<ul style="list-style-type: none"> <li>• Euratom Treaty (Art. 215)</li> <li>• Decision of the EU Council 2010/212/CFSP relating to the position of the European Union for the 2010 Review Conference of the Parties to the Treaty on the Non-Proliferation of Nuclear Weapons</li> <li>• IAEA programme</li> <li>• COM(2009)143 - Communication on nuclear non-proliferation</li> </ul>
International Nuclear Security (nuclear forensics)	<ul style="list-style-type: none"> <li>• IAEA programme</li> </ul>
Nuclear energy	<ul style="list-style-type: none"> <li>• Generation IV International Forum</li> </ul>

## GLOSSARY

(main report)

ACP	Africa, Caribbean and Pacific
AU	African Union
BAT	Best available techniques
BREFs	BAT reference documents
BSE	Bovine spongiform encephalopathy (mad-cow disease)
CAFE	Cleaner Air for Europe
CBE	Cocoa butter equivalents
CEN	European Committee for Standardisation
CENELEC	European Committee for Electrotechnical Standardisation
CODEF	Council Working Party on Development Cooperation
COHAFA	Council Working Party on Humanitarian Aid and Food Aid
CRL	Community Reference Laboratory
CSF	“Horizon 2020”: the EU Common Strategic Framework for Research and Innovation
DG	Directorate-General
DGS	Deposit Guarantee Schemes
EARTO	European Association of Research and Technology Organisations
EC	European Community
ECCAIRS	European Coordination Centre for Accident and Incident Reporting
ECDC	European Centre for Disease Prevention and Control
ECHA	European Chemicals Agency
ECVAM	European Centre for the Validation of Alternative Methods
EEA	European Environment Agency
EFDI	European Forum of Deposits Insurers
EFSA	European Food Safety Authority
EFTA	European Free Trade Association
EIA	Environmental Impact Assessment
EMM	European Media Monitor
ERA	European Research Area
EU	European Union
EURAB	European Research Advisory Board
EURATOM	European Atomic Energy Community
EUROSUR	European border surveillance system
FAO	Food and Agriculture Organisation of the United Nations
FP5	Fifth Framework Programme
FP6	Sixth Framework Programme
FP7	Seventh Framework Programme
FRONTEX	EU Agency for the Management of Operational Cooperation at the External Borders
GDACS	Global Disaster Alert and Coordination System
GEOSS	Group of Earth Observation Systems of Systems
GMES	Global Monitoring for Environment and Security
GMO	Genetically Modified Organism
IAEA	International Atomic Energy Agency

ICAO	International Civil Aviation Organisation
ICT	Information and Communications Technologies
IEA	International Energy Agency of the OECD
IED	Industrial Emissions Directive
INSPIRE	Infrastructure for Spatial Information in Europe
IPPC	European Industrial Pollution Prevention and Control
ISO	International Standardization Organization
JRC	Joint Research Centre
KP	Kimberley Process
LCP	Large Combustion Plant
MIC	Monitoring and Information Centre of the Commission
NGO	Non-governmental organisation
NEA	Nuclear Energy Agency
NIST	National Institute for Standards and Technology in the United States
OECD	Organisation for Economic Co-operation and Development
PAR	Periodic Action Review
PDNA	Post Disaster Needs Assessment
PUBSY	Publications Repository of the JRC
R&D	Research & Development
REACH	Registration, Evaluation, Authorisation and Restriction of Chemical substances
RTO	Research and technology organisation
S&T	Science & Technology
SEA	Strategic Environmental Assessment
SYMBOL	Systemic Model of Banking Originated Losses
TEN-T	Trans European Network -Transport
UN	United Nations
UNDP	United Nations Development Programme
UNEP	UN Environment Programme
UNFCCC	UN Framework Convention on Climate Change
UNITAR	UN Institute for Training and Research
UNOSAT	UNITAR Operational Satellite Applications Programme
US or USA	United States of America
VOLY	Value of life year
VSL	Value of statistical life
WHO	World Health Organisation
WMO	World Meteorological Organisation
WTO	World Trade Organisation

## Notes

## Notes

European Commission

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**Abstract**

This report presents an impact analysis of JRC's direct research actions, in line with the Commission's principles to focus on EU added value, impacts and results and following recommendations from earlier JRC programme evaluations.

The report uses an analytical framework built around policy impact (i.e. the impact of JRC work in the policy process) as well as technical impacts, economic impacts and intangible impacts. It looks at the JRC's achievements, impacts and results with a special focus on costs and benefits and contains four parts:

- Demonstrable policy impacts of JRC activities in 2010
- Five case studies with specific impacts and benefits of JRC support activities
- An estimation of the JRC's overall economic impact
- The JRC and Europe 2020

The report closes with a number of findings and forward-looking conclusions of the Steering Group experts who guided the impact analysis, highlighting the JRC's added value, rooted in its impartiality as well as its pan-European scope and range of action.

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