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IMPACT ASSESSMENT

Accompanying the

Communication from the Commission 'Horizon 2020 - The Framework Programme for Research and Innovation';

Proposal for a Regulation of the European Parliament and of the Council establishing Horizon 2020 – the Framework Programme for Research and Innovation (2014-2020);

Proposal for a Council Decision establishing the Specific Programme implementing Horizon 2020 – The Framework Programme for Research and Innovation (2014-2020);

Proposal for a Council Regulation on the Research and Training Programme of the European Atomic Energy Community (2014-2018) complementing the Horizon 2020 – The Framework Programme for Research and Innovation

Annexes

Annex 0: List of Boxes Presenting Complementary Information on Concepts and Evidence Used in the Report

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ANNEXES

ANNEX 0: LIST OF BOXES PRESENTING COMPLEMENTARY INFORMATION ON CONCEPTS AND EVIDENCE USED IN THE REPORT

Box 1: European research and innovation programmes support scientific excellence

Excellence has been one of the main principles underlying EU research support, and one of the keys to its success has been its ability to attract top scientists, top institutions, and first-rate projects.

Attracting top scientists: European Union research programmes have always attracted top level researchers. FP funded scientists tend to have a better publication and citation performance than their non-FP peers (e.g. see European Policy Evaluation Consortium, 2009). The FP also helps to attract leading researchers who might otherwise have pursued their careers in the US. For example, two-thirds of the ERC's grant-holders in neurosciences have had post-doctoral experience in the US. Moreover, between 2008 and 2011, six of the 17 Europeans who were awarded prestigious research prizes were ERC grantees.

Attracting leading institutions: EU research and innovation programmes have also attracted the very best research institutions. The interim evaluation of FP7 concluded that ""the list of organisations that have obtained the largest amounts of funding from FP7 can be read as a Who's Who of European research quality".

- Leading universities: About half of top university participants in FP6 rank among the world's best 100 universities, and 94 percent rank among the world's best 400 universities (Academic Ranking of World Universities 2010).
- Top industrial performers: Compared to the average company in their sector, FP industrial participants are more R&D-intensive, more innovative, better networked and more focused on international markets, and patent more (Polt et al., 2008). 31 out of 34 European companies in the Top 100 R&D investing companies received funding under FP6.
- Excellent public research centres: The FP provides support to Europe's leading public research centres such as the Max Planck Gesellschaft, the Fraunhofer Gesellschaft, the CNRS and the Commissariat à l'Energie Atomique which occupy key positions in FP projects and networks.

Financing first-rate projects: FP proposals are peer-reviewed and scored according to three criteria: scientific excellence, project management quality, and potential impact. The mean score for 'scientific quality' was 4.4 out of 5 (minimum 4) and the mean sum for the three criteria was 13.1 out of 15. As a result, EU research is recognized as leading in a number of fields. For example this is the case in several environmental research areas (EPEC, 2008), where, according to peer reviewers, the impact of EU research is particularly high for projects in three areas: climate change, water and soils, and natural hazards. Not surprisingly, EU funded projects are also visible and influential in the top scientific literature. In 2010, at least one ERC funded project reported its findings in either Nature or Science every two weeks.

See Annex 1 for more detail on how EU research and innovation programmes support excellence

Box 2: EU research and innovation programmes produce value for money

The impact of public R&D is significant and widely documented (Annex 2). For example:

- Studies have shown that the rate of return for publicly funded R&D usually exceeds 30 percent, and that each extra 1 percent in public R&D generates an extra 0.17 percent in productivity growth.
- Estimates of the impact of UK Research Council spending suggest that a cut of £1 billion in annual spending would lead to a fall in GDP of £10 billion.
- Spending by the US National Institute of Health supported nearly 488,000 jobs and produced US$68 billion in new economic activity in 2010.

EU research programmes produce excellent value for money for the European taxpayer not only because they generate the significant impacts of public R&D outlined above, but also because EU projects are selected to have a higher impact than national public R&D support (see Box 9). Specific studies have examined the effects of EU funding and have demonstrated the following economic impacts:

- €1 of Framework Programme funding leads to an increase in industry added value of around €13.
- Member States' own evaluations demonstrate the high impact of the FP: the FP's annual contribution to, for instance, UK industrial output exceeds £3 billion.
- On the basis of econometric modelling, the long-term impact of FP7 has been estimated at an extra 0.96 percent of GDP, an extra 1.57 percent of exports, and a reduction of 0.88 percent in imports.
- The long-term employment impact of FP7 was estimated at 900,000 jobs, of which 300,000 in the field of research.
- The potential value added generated by eco-innovation pilot and market replication projects under CIP could be calculated in some € 3.4 million per million € invested (DG ENV, ref. Varma, 2007).

In addition, to these excellent economic returns, EU research actions have also generated major social and environmental impacts (Box 20 and 21).

See Annex 1 sections 2.10, 2.11, 2.12 for more details of how EU research actions offer value for money

Box 3: Assessing the leverage effects of EU research and innovation programmes

EU research and innovation programmes leverage private funding, as demonstrated by a wealth of evidence:

- An extensive body of academic economics literature has demonstrated that public subsidies for R&D produce crowding-effects, i.e. have a positive net effect on the total availability of R&D funding, and that these crowding-in effects are larger for collaborative research (Annex 2).
- An econometric analysis of Community Innovation Survey micro-data carried out by JRC in collaboration with DG Research & Innovation has concluded that FP support has a crowding-in effect on the level of companies' R&D investments (Box 18).
- These findings are confirmed by a wide range of ex-post evaluations:
  - The Clean Sky Joint Technology Initiative mobilises about €800 million in private in-kind contributions to achieve the single largest aeronautics research venture in Europe so far.
  - The multiplier effect of the FP7 Risk-Sharing Finance Facility, an innovative debt financing instrument jointly set up by the Commission and the European Investment bank that provides loans and guarantees for private companies or public institutions with a higher financial risk profile for their research, technological development and innovation activities (RDI), is expected to be 12 between the EU contribution and the volume of loans, and over 30 between the EU contribution and the additional leveraged investment in RDI.
  - CIP financial instruments supporting innovation in collaboration with the European Investment Fund (EIF) have acted as a cornerstone investor in 17 venture capital funds leveraging €1.3 billion of total investment in growth-oriented SMEs. The leverage effect of the GIF, which concerns equity investments, is 6 to 1.
  - The space innovation project KIS4SAT (start-ups, business support schemes, vouchers for innovation activities) leveraged €10-20 million via involvement in supporting fund raising activities.
  - A recent external evaluation of EIT suggests that the overall leverage effect of its KIC funding will be between 4 and 5 to 1 (€1 of EIT funding produces €4-5 of additional funding) by the end of 2013.The EIT provides on average up to 25% of KIC budgets, which leverages 75% of supplementary investment emanating from a range of public and private sources.
  - 60% of all surveyed FP7 health research participants stated that EU funding helped access other research funding. 15% of the SMEs that leveraged additional research funds did so from business angels or venture capitalists.

EU research and innovation programmes also leverage public funding:

- For ERA-NETs, the leverage effect of FP funding is close to 5, while for ERA-NET Plus, it is 2.5. More than 15 of the initial FP6 ERA-NETs achieved leverage effects of 10 and more: €1 of FP funding resulted in €10 of coordinated research funding.
- A survey among FP6-IST programme participants (WING, 2009) showed that about two thirds (~65%) of industry participants increased their ability to get further R&D funding not only in-house but also (and especially for SMEs) from other EU or national sources.
- FP participation in Socio-Economic Sciences and Humanities (SSH) facilitated access to additional funding in 68% of the projects.
- Marie Curie actions leverage additional regional, national and international funds through the co-funding mechanism of individual fellowships such as COFUND. The total budget of the 81 COFUND programmes selected amounts to €528 million, of which only €211 million is contributed by the EU.
- The Euratom SARNET-2 Network of Excellence defines joint research programmes and develops common computer tools and methodologies for safety assessment of nuclear power plants. With an EU contribution of just €5.75 million out of a total budget of €38 million it generates for each €1 FP funding more than €6 additional research funding.

See Annex 1 for additional evidence on leverage effects

Box 4: Assessing the impact of the direct research actions of the Joint Research Centre

As the Commission's Directorate-General responsible for direct research, the JRC is known for its support to EU policies and its contributions to sustainable development, competitiveness and the security and safety of nuclear energy. It makes science more visible in the work of the Commission in support of more evidence-based policy processes.

To underpin proposals for its 2014-2020 programme the JRC prepared an impact report with a steering group of external experts, presenting new facts about the outcomes and impacts of the direct research actions of the JRC with:

- an analysis of the policy impact of JRC activities in 2010
- case studies of specific impact for long-term JRC support
- an estimate of JRC's economic impact
- expectations for future impact

The analysis of JRC internal output and impact data for the year 2010 shows that around 85% of the JRC actions achieved a verifiable tangible "policy impact". Roughly 75% of these impacts occur in the Commission and relate to EU policies.

The case studies in the report show JRC actions in selected examples achieving cost-benefit ratios from 1:40 up to as high as 1:250 (cf. annex 1 success stories).

The economic impact of the JRC is placed into the perspective of a recent study commissioned by the European Association of Research and Technology Organisations (EARTO), reporting that 275 RTOs in Europe with a combined annual turnover of around EUR 20 billion generate an estimated economic impact of the order of EUR 100 billion.

Cost-benefit ratios for the JRC are favourable and its return on investment is sizeable and significant. Nevertheless, the external experts place strong emphasise on the huge importance of the JRC's impact on intangible EU assets, such as enhanced human capital, knowledge creation and sharing, competitiveness from setting European standards, better policy decision making.

Regarding future impact of the JRC, the baseline is a scenario with permanent institutional support to EU policies leading to continued significant impact and return on investment in policy areas where science plays a sensitive role, i.e. in areas involving people's health, people's safety, the environment as well as the competitiveness of the European economy.

On top of this baseline, new activities will address priority areas in the Commission's flagship initiatives and generate relevant impacts for the achievement of the Europe 2020 strategy.

Developments giving rise to new environmental, economic and political situations beyond the Europe 2020 strategy cannot be predicted, but the experience is that the JRC is able to respond quickly and effectively to sudden events and crises. In these situations the JRC is likely to generate further impact through flexibility and quick response.