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Risk-Sharing Finance Facility (RSFF)

Investing in European research and innovation

SEVENTH FRAMEWORK PROGRAMME

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Editorial coordination
Melinda Kurzné Opóczky

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European Investment Bank President
Philippe Maystadt

One of the ways to support Europe's innovation capacity is by providing adequate access to finance. This is also a top priority under the Innovation Union flagship initiative as part of the Europe 2020 Strategy - as it is essential to ensure Europe's growth and competitiveness. Europe will keep its rank in the global economy only if we are leading in some technological areas.

But securing funding for research, development and innovation (RDI) can be difficult. Products and technologies are complex and assessing the value of intangible investments is not easy. Lending in RDI implies taking an inherent higher degree of risk, but with a potential greater impact on growth. Therefore, we need innovative loans to support innovative ideas.

The European Commission (EC) and the European Investment Bank (EIB) have worked closely together to create, fund and manage the Risk Sharing Financing Facility (RSFF), a true joint funding instrument that helps turn good ideas into reality and tackles Europe's RDI challenges. The RSFF is an innovative tool to improve access to finance higher-risk projects for more value added.

The RSFF combines EU budgetary resources and EIB funding to share the risk associated with research, development and innovation projects: one billion euro come from the European Union budget for the 7th Framework Programme for Research and Technological Development (FP7) and another billion euro from the EIB's own resources. Thanks to the multiplier effect of the RSFF the EIB will have provided up to 10 billion euro in loans for higher-risk investments in RDI by 2013.

Since its creation in 2007, the RSFF has filled a real market gap by responding to a strong need for innovative RDI financing solutions, especially in difficult financial times. It is an excellent example of how a fruitful partnership between the European Commission and the European Investment Bank can support research, development and innovation to the benefit of Europe's competitiveness. At the end of 2010, RSFF loans have supported 87 projects in various key areas. This publication presents some concrete examples of RDI projects that have already been funded by the RSFF with a direct impact on people's daily lives.

The European Commission and the European Investment Bank want to build on and extend this success to meet the challenges ahead. Let's take risks and invest in research, let's invest in innovation! It is actions like these that contribute to building an "Innovation Union" and fulfilling the Europe 2020 Strategy goals by turning good ideas into jobs, green growth and social progress.

Máire Geoghegan-Quinn
European Commissioner for Research, Innovation and Science

Philippe Maystadt
President of the European Investment Bank

The projects mentioned or featured in this issue of *research*eu focus* were chosen to represent the important research and innovation activities under way through the 'Risk-Sharing Finance Facility' (RSFF). For a more detailed picture, we recommend you visit the links mentioned on page 5 of this issue.

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Frequent acronyms

FP6/7	Sixth/Seventh Framework Programme
CNES	Centre National d'Études Spatiales
CO_2	Carbon dioxide
CORDIS	Community Research and Development Information Service
EC	European Community
EIB	European Investment Bank
EIF	European Investment Fund (part of the EIB group)
ESA	European Space Agency
ESRFI	European Strategic Forum for Research Infrastructure
EU	European Union
GDP	Gross domestic product
ID	Identification
JTI	Joint technology initiative
R&D	Research and development
RDI	Research, development and innovation
RSFF	Risk-Sharing Finance Facility
SMEs	Small and medium-sized enterprises
Mid-Caps	Mid-Caps are enterprises with 250-3 000 employees

Introduction to RSFF

Over 25 years of experience in funding research, development and innovation (RDI) activities across Europe has given the EU an important body of knowledge on what it takes to transform bright ideas and technical insights into innovative and marketable products and services. One early and key lesson from this knowledge base is that access to the right form of finance at the right time in the development cycle is a critical success factor for researchers and innovative companies.

For this reason, over the years, the EU has coordinated and supported a variety of RDI funding mechanisms. These range from direct grants from the Seventh Framework Programmes for Research, Technological Development and Demonstration Activities (FP7), through a portfolio of venture capital and credit guarantee schemes aimed at SMEs, to the larger bank loans required to industrialise products and bring them to market. The European Investment Bank, together with its subsidiary the European Investment Fund, has a strong presence in these two latter mechanisms.

This issue of *research*eu focus* describes an innovative funding mechanism established jointly by the European Commission and the European Investment Bank (EIB) — the Risk-Sharing Finance Facility (RSFF). This facility represents a response to three well-defined aspects of the EU research landscape which concern: the level of RDI funding across the EU, the sources of this funding, and the nature of the projects it is spent on.

RDI investments: more is better

The EU and Member States are simply not spending enough on funding for research, development and innovation. As figure 1 shows, Europe is spending less than its competitors in the developed world in proportion to its GDP. More significantly, while EU RDI spending as a percentage of GDP is stagnating, spending in emerging economies such as China is rising steadily. Overall, while a few EU Member States have RDI investment levels that are world-class, most do not. It is clear that, for a more competitive and sustainable knowledge-based economy, more RDI investment is needed to create jobs and growth for the future.

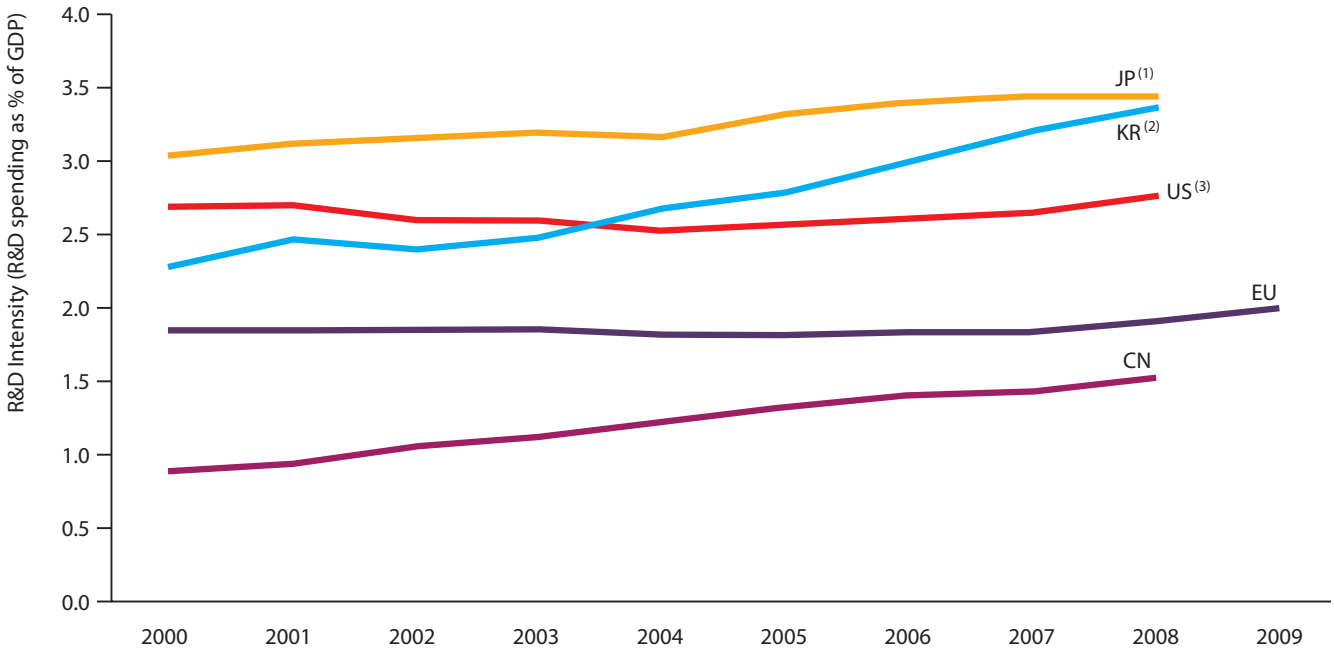
RDI investments: a private matter?

There is another significant feature of RDI funding in Europe: private sector RDI funding is low in comparison with other countries. Data reveals that of total RDI funding, the EU private sector contributes around 9% less than in the US and 20% less than in Japan. Private sector funding means RDI performers use their own funds for investment or funds they receive from commercial banks and financial institutions, such as venture funds. So, it is not only the absolute amounts spent on RDI that matter — Europe also needs to focus on the composition of research spending and to improve the conditions for private sector RDI in the EU.

RDI investments: a market gap

The third aspect of EU RDI funding, which supports the rationale behind the RSFF, is that of risk. Innovation is by nature a matter

Figure 1. Evolution of R&D intensity between 2000 and 2009



Source: DG Research and Innovation, Innovation Union Competitiveness Report 2011
Data: Eurostat, OECD
Notes: (1) JP: There is a break in series between 2008 and the previous years.
(2) KR: (i) GERD for 2000-2006 (inclusive) does not include R&D in the social sciences and humanities.
(ii) There is a break in series between 2007 and the previous years.
(3) US: GERD does not include most or all capital expenditure.

of trial and error and may therefore be a higher-risk, but also higher-reward investment. Simply put, finance providers consider some RDI funding proposals too uncertain with respect to their outcomes. Products and technologies are complex and assessing the value of intangible investments is not easy. In such cases, a conservative finance provider will seek more traditional investment areas, perceived as safer, or just not invest in RDI at all.

However, it is clear that more private financing of RDI contributes to a more innovative economy. It is also known that the EU research sector suffers from a lack of funding for top-quality RDI projects with the potential to create jobs and growth across Europe. This lack of funding for high-risk, high-reward, RDI activities reveals a market failure: financial markets are not devoting enough resources to deserving RDI projects. This market gap requires intervention by public authorities to support and encourage private finance providers to take on more risk — which is where the RSFF comes in by helping private sources of RDI funding to share, and thus reduce, their risk.

A joint response

This section has introduced the rationale behind the Risk-Sharing Finance Facility (RSFF). It is driven by the general need to raise the level of RDI investment in Europe which is below that of its competitors. It also seeks to raise the proportion of private investment in RDI, which is known to be a success factor for innovation. In particular, it is aimed at filling an identified gap in the market for access to finance for RDI that is due to the higher degree of risk for investors. Through the RSFF, RDI investment risks are shared between the EIB and the European Commission together with private investors. By spreading the risks involved in RDI investments, the RSFF helps to create a unique leverage effect and encourages higher levels of private investment. This publication covers the RSFF in greater detail, how it works and what it is achieving.

Useful links

RSFF (Europa): http://ec.europa.eu/invest-in-research/funding/funding02_en.htm
RSFF (EIB): http://www.eib.org/products/loans/special/rsff/index.htm

How the RSFF works

In 2007, in response to the identified need for more risk financing for research, development and innovation (RDI) — a top priority under the EU's goal to improve its competitiveness — the European Investment Bank (EIB) and the European Commission set up the Risk-Sharing Finance Facility (RSFF).

The RSFF is an innovative, debt-based financial instrument, supported by contributions from the European Union's Seventh Framework Programme (FP7) and the EIB's own funds, which allows the Bank to provide loans to higher-risk, but potentially also higher-reward innovative projects undertaken by research-intensive companies and organisations. The European Commission and the EIB implement the RSFF in partnership.

The European Union, through the FP7, provides much support to research, development and innovation in Europe. The EIB, since 2000, has also provided loan financing in excess of EUR 103 billion for projects involving education and RDI. Through the RSFF, the Commission and the EIB are now filling a gap in the range of funding sources available to a wider range of RDI promoters. At the same time, by spreading the risk burden of the investments, the RSFF encourages higher RDI investments by the private sector in particular, thus contributing to EU targets on RDI.

The EIB provides substantial support to develop the knowledge economy — lending around EUR 16.5 billion in 2010 to RDI projects involving education, research and development and innovation. Significantly, these RDI investments often carry a higher risk profile than more conventional lending operations, such as for transport or energy infrastructure. For the EIB, the partnership with the Commission in the RSFF allows it to extend its product portfolio and to leverage substantial funds for desirable RDI investments that might otherwise not occur.

Complementary goals

While public and private sector investment in RDI projects is vital for Europe, private funding sources for such investments are sometimes difficult to find. This can be due to the nature of the projects seeking funding: they may be highly complex, they may involve unproven markets or intangible or soft assets that are hard to measure, such as know-how acquired for example. They may also be too uncertain for a confident evaluation by the commercial financial sector. Whatever the reason is, private investors consider them simply too high risk to put money into on their own.

However, while they may be considered high risk by private investors, many of these projects are highly desirable in terms of their innovative potential. This is why the EIB and the Commission set up the RSFF: to ensure that such projects are undertaken in a risk-sharing lending arrangement that also gives other private sector lenders the confidence to fund these higher-risk projects jointly.

Funding and multiplier effects

The EIB is owned and funded by the 27 EU Member States which are the Bank's shareholders. Each Member State contributes capital according to its share of EU GDP.

Since April 2009, the total capital of the EIB amounted to EUR 232 billion, of which 5 % is paid in by the Member States. Backed by the Member State contributions, the EIB raises the bulk of its funds on national and international capital markets — which it can do at very advantageous conditions due to its AAA rating, the highest credit rating on capital markets. The borrowed funds are made available for loans and other financial products in the Bank's operations. The RSFF is one of the 'special instruments' in EIB lending operations.

The 'risk-sharing' element of the RSFF is based on the EIB and the EU providing up to EUR 1 billion each of capital to the RSFF — creating a reserve of EUR 2 billion to serve as a cushion to cover potential losses on lending operations. The EU provides its share from FP7, and the EIB from its own funds. This 'capital cushion' allows the EIB to provide up to EUR 10 billion as loans or guarantees for RDI projects. In this way, every euro provided by the partners translates into five euros of RDI investment.

However, the cushion provided by the partners does more than just leverage EIB funding. It also encourages private investors, such as commercial banks and investment funds, to participate in funding selected RDI projects. They do this because they have confidence in the EIB's expertise in evaluating the creditworthiness of complex and high-risk projects — so the EIB's decision to invest in a project acts as a beacon encouraging other investors to participate in line with their own risk profile.

Even more leverage is obtained by the diverse loan structures the RSFF can employ; for example, the EIB can provide subordinated (junior) loans from the RSFF, in addition to senior loans from a private investor. The senior loans are repaid before the junior loans if the project fails — this reduces the risk for private investors and thus encourages investment in the project. Private investment is also encouraged by the portfolio approach to smaller projects where the EIB provides a loan and/or shares the risk through a guarantee to a partner commercial bank, which in turn uses the loan to invest in several smaller projects. In such cases, the commercial investment bank can be encouraged to co-finance some projects with its own funds — again leveraging private funds for RDI.

Who gets financed?

RSFF loans are available to public and private sector promoters of any size and ownership from the EU Member States and associated countries to FP7, which are seeking funding for RDI activities. These eligible

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organisations can include large corporations, Mid-Caps, small and medium-sized enterprises, research institutes and universities. 'Special purpose vehicles' (SPV) set up to implement a project can also be funded, as can promoters of large research infrastructure projects, such as satellite consortia. Of course, although the size and nature of the organisation does not determine eligibility, the fact that loans are sought, rather than grants or venture capital of some kind, means that beneficiaries are generally past the start-up stage.

What gets financed?

RDI project activities that are considered for loans include the full range of research, development and innovation activities, from fundamental research to innovation in products and production processes. Projects that receive RSFF support can cover all sectors. However, socio-economic sciences and humanities, as well as military and nuclear energy RDI are excluded. In practice, funded sectors notably include ICT technologies, life sciences, energy, and industrial engineering. This wide application of RSFF lending is shown in the section on project examples. The RSFF is also supporting EU research initiatives such as technology platforms and 'Joint technology initiatives' (JTI). Research infrastructures, that involve at least three countries, are supported through the 'Capacities' Specific Programme. A special RSFF sub-facility is being developed by the EIB for financing significant research infrastructures.

Within these broad headings, loans can be used to fund 'bricks and mortar' such as new laboratories and equipment to fill them, as well as soft investments such as R&D operating costs, personnel costs, and the costs of acquiring or protecting patents.

Eligible, creditworthy and… high risk

When evaluating the eligibility of RSFF project funding proposals, the European Commission checks that they contribute to FP7 objectives and thus EU research policies. For the EIB, all projects it funds must be technically, economically, financially and environmentally sound; however, for the RSFF a certain level of risk must be present, otherwise other sources of EIB funding might be more appropriate. The EIB uses its technical and financial know-how to evaluate and balance the elements of creditworthiness and risk for a given project proposal. Figure 2 gives an idea of the appropriate levels of risk by comparison with the risk categories used by global ratings agencies for sovereign and corporate debt.

Figure 2.
Rating agencies' categories

Moody's	S&P and Fitch
…	…
A1	A+
A2	A
A3	A-
Baa1	BBB+
Baa2	BBB
Baa3	BBB-
Ba1	BB+
Ba2	BB
Ba3	BB-
B1	B+
B2	B
B3	B-

RSFF Risk Coverage Range

As the table shows, the RSFF seeks to fund projects with equivalent ratings of BBB- and below, thus carrying a fair degree of risk which may be unattractive to a private institutional investor. More highly rated projects can usually find other sources of funding from commercial banks and private investors. In this risk assessment, the EIB balances the creditworthiness of the project promoters against the size of the loan and the benefits that the successful completion of the project would offer to EU goals.

Figure 2 also highlights another feature of the RSFF: the EIB has the highest rating of all (AAA) and can raise funds from global money markets at relatively low cost. In the case of the RSFF, it aims to lend this money at comparatively attractive interest rates to projects that have a relatively low rating and high-risk profile. It does this because most private investors take a predominantly commercial viewpoint and therefore avoid high-risk investments. Yet this ignores the potential benefits that success could bring — the desirability of the results of a successful project. It is this market gap that the Commission and the EIB, through the RSFF, are addressing.

How does the RSFF lend?

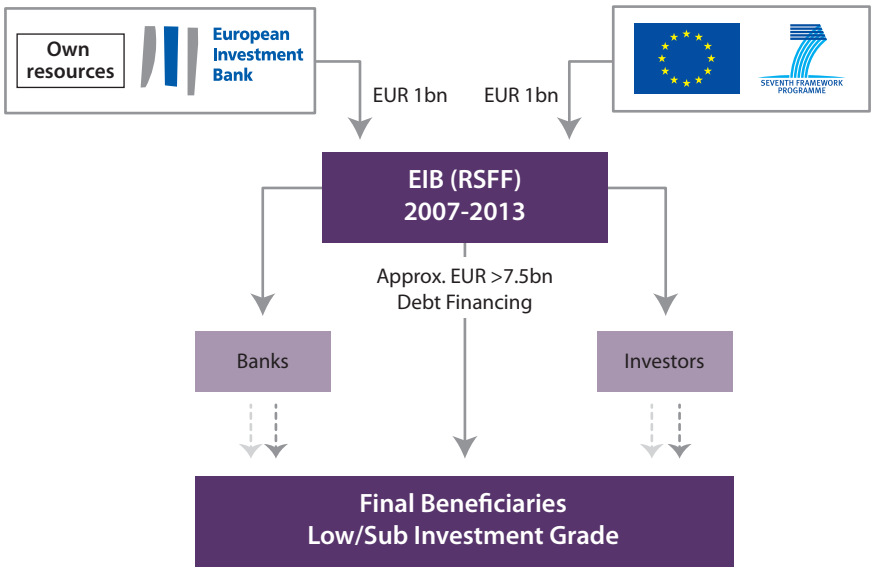
First of all, there are three main features to RSFF funding:

- The RSFF involves loans that bear interest and must be repaid — it is a debt-based instrument with no elements of grant or subsidy. Loan repayments can be used to fund further RSFF loans.
- The RSFF funds up to a maximum of 50% of the project costs, while the beneficiary must provide the other 50% from own resources or other investors.
- The RSFF is demand-driven by the financing needs of RDI project promoters and works on a 'first come, first served' basis.

The EIB screens potential RSFF projects and is the contact point for the project promoters. It evaluates the RDI content and sends the proposals to the 'Eligibility committee' in the European Commission which comprises relevant Commission services. The committee evaluates the project based on the contribution to the goals of the FP7 co-operation and Capacities (for research infrastructures) specific programmes before approving it. The committee can request further information through the EIB if needed. The EIB further evaluates the proposals for creditworthiness, techno-economic and financial viability before approval.

How the approved loans are structured and managed is flexible and in line with the needs of the particular project beneficiary. Generally, for loans of EUR 7.5 million or more the EIB deals directly with the borrower. For loans under this amount, the EIB can work with intermediaries and partner banks. These two lending structures are shown in figure 3.

Figure 3. EUR 10 billion Risk-Sharing Finance Facility



Intermediaries may also be involved in the 'Risk-sharing bank facility' structure which employs a 'mezzanine' structure suited to a portfolio of smaller or medium-sized projects such as the Medinvest project presented in this issue of *research*eu focus* (see page 14). In this case, the intermediary can be a partner financial institution or, as in the Medinvest case, another entity or fund working on a number of smaller projects with SME participants.

The added value of the RSFF

For the EU research community and project beneficiaries, the RSFF is offering substantial added value. Indeed, the RSFF is a win-win-win initiative for all concerned: RDI project promoters are getting the funding they need for worthwhile projects, private financial institutions have the chance to invest in these projects because of the confidence they have in the EIB, and the Commission and the EIB are supporting EU research policies and helping Europe release its innovation potential.

The RSFF is successfully supporting ambitious RDI projects in a wide range of sectors across Europe. These projects were all selected because they are key drivers of RDI, thus boosting competitiveness, and have the potential to change the lives of European citizens for the better.

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The RSFF in action: progress so far

This section sets out the progress of the RSFF since its inception in 2007. In particular, it presents the figures for the number of lending operations and their size, and the loan volume distribution between sectors and among the EU Member States and Associated Countries of FP7.

The growth in the volume of RSFF lending is shown in the bar chart in figure 4. The demand for RSFF loans to finance research, development and innovation projects exceeds the initial projections by far, with 87 approved loans for a total amount of EUR 8.7 billion, and 63 signed loans amounting to EUR 6.3 billion by the end of 2010. RSFF loan approvals correspond to the loans which have been approved by the EIB board for RSFF funding, before a loan can be signed and ultimately disbursed. The exceptionally high lending in 2009 shows the RSFF acting as a contra-cyclical instrument in response to the developing economic crisis. Since other sources of RDI funding were squeezed, the RSFF responded by increasing lending to take up the slack.

The capital cushion provided by the European Union and the EIB allows the Bank to raise over EUR 10 billion for RSFF lending, so by 2010 results were exceeding initial expectations.

Heavyweight lending

The bar chart illustrates a further feature of the RSFF — the large impact of the loans. This reflects the ambitious nature of the innovation projects. However, a lending operation does not always translate into a single project. A 'mezzanine' loan to a financial institution or large company may be used to fund many smaller projects in SMEs — as illustrated by the Medinvest and Open Innovation projects described on pages 14 and 16 of this publication, respectively. And loans to larger companies often translate into funding for their SME partners and suppliers as part of the targeted RDI activities.

Successful take-up of loans

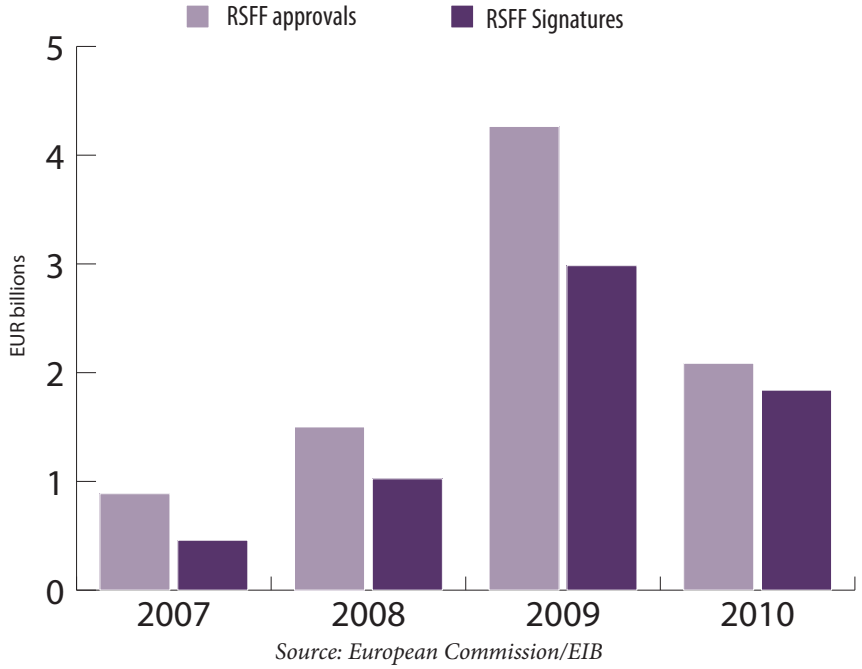
The RSFF has seen a rapid and successful take-up since it started in 2007. Lending is reaching its target groups across important industrial sectors and is achieving a wide geographical spread across the Union and Associated Countries. Furthermore, most of the financing is being taken up before new products are brought to market where often quite large investments are needed compared to the earlier stages.

The successful demand for RSFF loans seen so far is continuing, and indeed is accelerating. The 'European economic recovery plan' identified the RSFF as an important instrument for stimulating RDI activities during the current economic crisis, which has affected commercial bank lending particularly severely. Therefore, in 2009 the European Union contributed an additional EUR 70 million to the RSFF, frontloaded from the foreseen 2010 EU contribution to RSFF, leveraging a further EUR 350 million in potential loans. As a result, a strong demand was observed in 2009, leading to a high project volume, especially from engineering and automotive companies. The RSFF project pipeline shows a continually high demand for RSFF loans in the future. This demonstrates the urgency to respond adequately to expectations, and notably to support innovative target groups.

➥

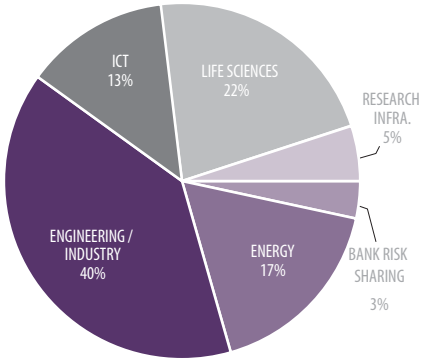
Figure 4. RSFF operations by year 2007-2010

By 2010, funding for 87 projects worth over EUR 8.7 bn had been approved.



Source: European Commission/EIB

Figure 5. Signed RSFF projects by sector



Source: European Commission

A broad sector spread

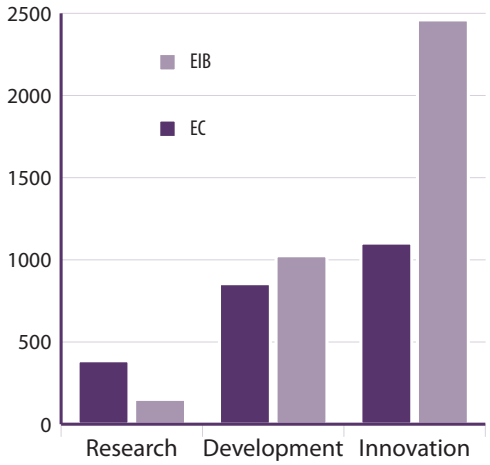
The flexibility of the RSFF and the demand for loans is reflected in the take-up across a wide spectrum of economic sectors. As figure 5 shows, by December 2010 the engineering and industrial sector had received the largest part of lending so far — but not the majority. The energy, ICT and life sciences sectors are well represented and, after intensive preparatory work, the research infrastructure sector is getting off the ground with the first loan signature for Alphasat, a joint undertaking of Inmarsat and the European Space Agency.

Innovation-led lending

RSFF project proposals can be classified on an RDI scale that locates their position in the innovation cycle — which is broadly divided into three classes: research, development and innovation, and then further subdivided into the stages seen in figure 6b. As the bar chart shows, by December 2009 most loan approvals covered innovation as a complement to research and development, including new-generation products, differentiating existing products through innovation, and process innovations for cost reduction and extended product lifetimes.

Figure 6a confirms that, as a debt-based instrument, RSFF lending is reaching the part of the RDI cycle it targets — the later stages beyond early-stage R&D. This reflects the complementary nature of the RSFF to other funding sources in the innovation cycle, (notably FP7 grant schemes).

Figure 6a & 6b. Classification of RSFF-approved projects (2007-2010) in the RDI scale



Innovation Cycle	RDI Scale	
	Stage	Description
Research	1	Intellectually-driven investigation with no foreseeable economic application.
	2	Investigation within established disciplines/ technologies.
	3	Applied research within existing technology boundary with practical applications in mind.
Development	4	Technology 'start-up' to develop practical applications for research ideas.
	5	Collaborative development within existing industries to produce new or next generation technology.
	6	Technical development of products following a defined longer-term technology 'roadmap'.
Innovation	7	Development of 'new generation' products involving substantial modification/innovation.
	8	Process/product innovation designed to modify/ improve/differentiate existing products.
	9	Process innovation designed to reduce cost or extend life of existing product range.
Not RDI	10	Investment in maintenance or expansion of existing production.

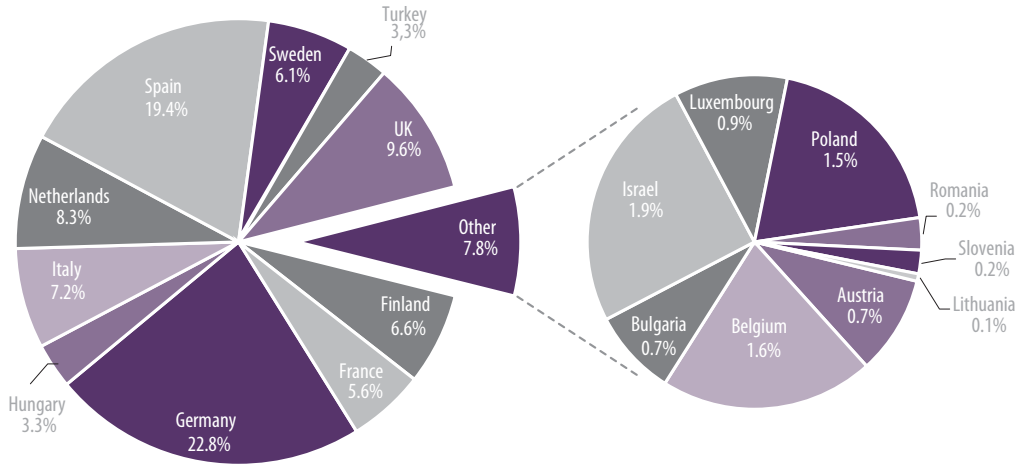
Source: European Commission/EIB

Europe-wide impact

The RSFF is open to all EU Member States and FP7 Associated Countries. The geographic spread of RSFF lending has increased steadily since it started, reaching 13 countries by the end of 2008 and 20 countries by December 2010. The chart in figure 7 shows the geographical spread of signed RSFF loans in December 2010.

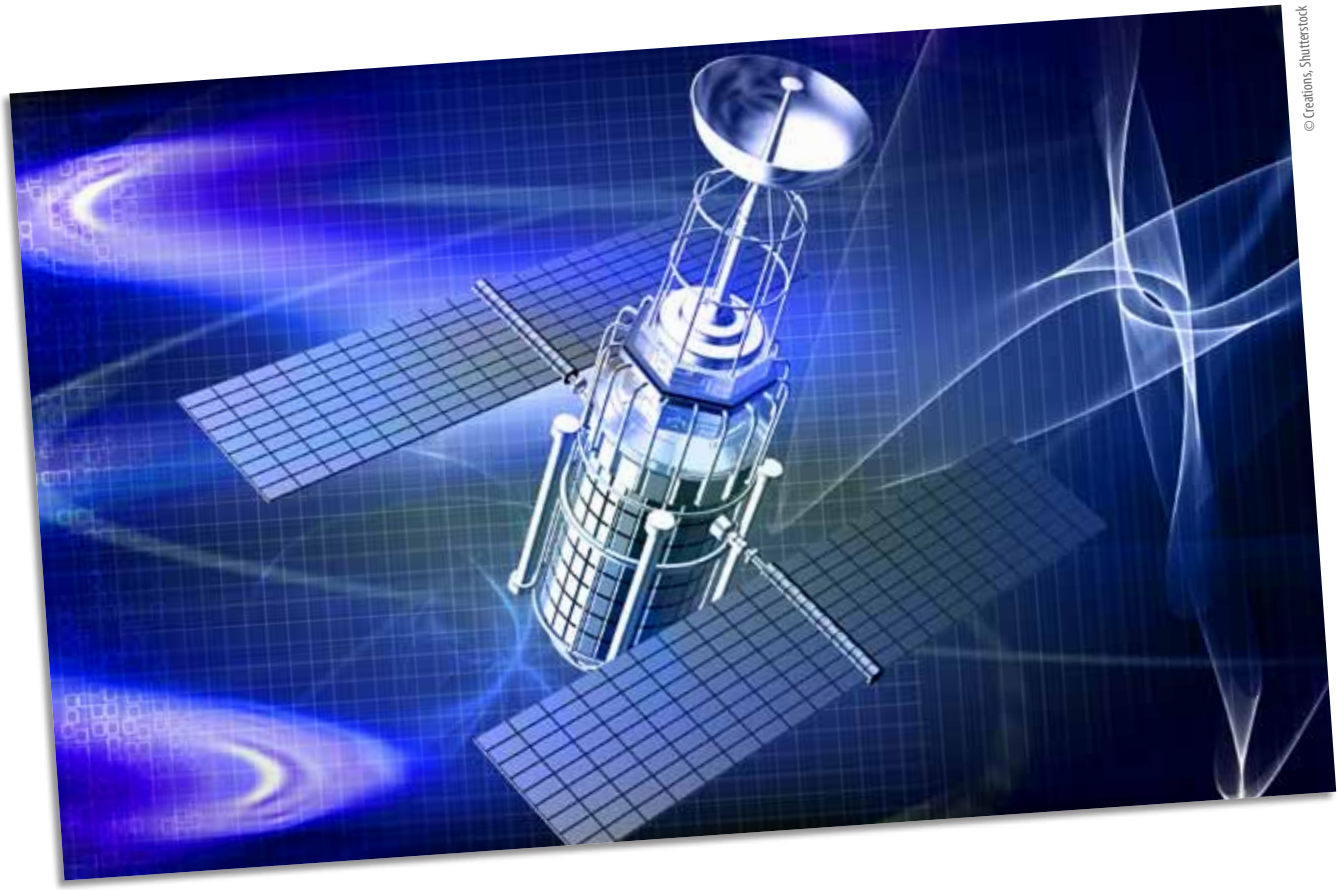
As the chart shows, not only large EU Member States are represented, but also the smaller ones. FP7 Associated Countries such as Turkey and Israel are also covered by the facility.

Figure 7. RSFF signatures (2007-2010)



While the RSFF targets excellence, it is also achieving a wide geographical spread, funding projects in 20 countries by the end of 2010, including many smaller Member States and Associated Countries.

Source: European Commission/EIB



Addressing specific needs

Project promoters of all sizes and from a range of sectors are both eligible for and are receiving RSFF loans. The degree of risk associated with the investment is one of the main selection criteria along with the desirability of the outcomes. There are some areas for which tailor-made solutions have been developed, including bringing SMEs into RSFF-funded activities and support for European Research Infrastructure.

Supporting SMEs

Small and medium-sized enterprises are proven sources of innovation and employment, and a sector the RSFF is targeting. This support is being provided in innovative ways, to support innovative SMEs in crucial phases of their development.

A broad portfolio of SMEs

The Medinvest project is financing RDI in the field of medical device technologies. It is using a EUR 30-million RSFF loan to invest in healthcare projects in innovative SMEs across Europe and in Israel. Diabetes, cardiovascular disease and cryopreservation technologies are among the areas of research. Significantly, the RSFF loan helped attract substantial private finance for this research, as described on page 14.

Open innovation at a high-tech campus

The Philips Group has received a EUR 200-million RSFF loan to fund early-stage, higher-risk healthcare R&D projects at its research campus in the Netherlands which houses 7 000 researchers and entrepreneurs and 90 partner companies. A portfolio of different healthcare projects is being implemented in partnership with start-ups, SMEs, research institutes and universities, both on the Philips campus and across Europe. For more explanation see page 16.

European Research Infrastructures: promoting big science

Since the RSFF was launched, the Commission and the Bank have actively promoted the support for research infrastructures to Member States and Associated Countries. To obtain funding, a research infrastructure project must either involve three countries or its services must benefit the research communities from three countries. The RSFF can contribute to the financing of Research Infrastructures, notably those identified in the context of the European Strategic Forum for Research Infrastructure (ESFRI). Overcoming complexity and risk for such important, large-scale scientific infrastructure projects is crucial to ensure Europe's competitiveness.

By the end of 2010, the EIB had signed one research infrastructure project — Alphasat, as described later — sharing the risk with the EU. There are also other major projects currently in the pipeline.

We have seen that the RSFF is supporting specific RDI sectors that are known to need flexible finance instruments. The next section presents specific projects covering a wide range of sectors that are receiving RSFF loans.

CASE STUDY

Heat exchangers: from coffee to supertankers

The GEA Group has expertise in process technologies used in demanding production systems found in, for example, the food processing, waste disposal and energy generation sectors. At the core of these processes is heat exchange technology — an area where RSFF lending is supporting GEA's development of innovative solutions, offering better, more efficient production systems.

Moving heat around is a critical process in many industrial technologies. In the dairy industry, milk and cheese production requires cooling of liquid milk itself as well as cooled environments for cheese production and storage. And elsewhere in the food industry heat exchange technologies also play a vital role, such as in beer and instant coffee production.

Meanwhile, in the energy sector, power plants of many types — such as biomass, waste incinerators and coal-fired units — need to cool and recover the water from their steam turbines. In the chemical and pharmaceutical sectors, heat exchangers are used in the purification, fractionation and extraction processes for producing vital chemicals and medicines.

The GEA Group Aktiengesellschaft is one of the world's largest manufacturers of these vital systems, employing over 20 000 people worldwide. And GEA is not only a market leader — it is also one of the leading innovators in this field. To maintain this position, GEA committed to a sustainable R&D programme targeting a continuous flow of new and better products for its global customer base.

Heat exchange technology is used in many industrial sectors, and new demands arise on a continual basis. For example, in 2010 stricter environmental provisions on the waste gases emitted from ships came into force. This is leading shipbuilders to demand ever-more efficient cooling systems that can trap gases such as nitrogen- and sulphur-based oxides, before they are released into the atmosphere. And GEA is at the forefront of supplying such cutting-edge systems to the marine sector worldwide. The project is contributing to the EU objective of increasing energy efficiency and savings in European industries.

GEA is not only a market leader in this field — it is also a technology leader

Efficient and integrated

The EUR 150-million RSFF loan to GEA supports part of a total investment worth EUR 313 million in research centres in Germany, France and the Netherlands to promote RDI activities leading to more efficient heat exchanger products and the integrated systems they are part of.

© GEA Group AG

Project name: **Process Technologies (RSFF)**
Total cost: EUR 313 000 000
RSFF financing: EUR 150 000 000
Signature date: 16 December 2009
Beneficiary: GEA Group AG
www.geagroup.com

Fighting cancer with drugs from the deep

Pharmamar is the first pharmaceutical company in the world to discover, develop and market cancer-fighting biomedicines based on materials of marine origin – sourced from the sea. This pioneering company received a EUR 30-million RSFF loan in 2008 to strengthen its R&D into new medicines for combating different types of cancer.

Part of the Spanish Zeltia group Pharmamar was founded in 1986 to advance cancer treatments by developing innovative drugs derived from marine life; indeed, the company has a unique marine organism library containing over 95 000 specimens.

To date, Pharmamar's research, development and innovation department has discovered 700 new chemical entities and identified 30 new families of compounds – resulting in over 1 800 patents and patent applications. At its head office in Madrid, the company has a workforce of 300 highly qualified professionals who specialise in the pharmaceutical sector. Pharmamar employees are part of a global network of excellence, in which more than 60 research centres and universities worldwide collaborate to find new discoveries in marine biology, chemistry, and cancer biology.

As a highly intensive RDI organisation Pharmamar devotes significant funds to supporting its researchers and bringing new drugs to market

The anti-cancer medicine Yondelis® was an early success for Pharmamar and was initially approved in Europe in 2007 for the treatment of soft tissue sarcoma, and then in 2009 for the treatment of relapsed ovarian cancer. It is the first in a new generation of anti-tumour drugs developed from marine compounds. Since that time, Yondelis® has been approved in 21 countries in Asia, Central and South America, as well as in Switzerland and Russia.

Pipeline economics

As a highly intensive RDI organisation, Pharmamar devotes significant funds to supporting its researchers and bringing new drugs to market. Since its foundation, the company has invested over EUR 450 million in RDI activities. This expenditure is necessary because of the extensive and expensive clinical trials needed to obtain regulatory approval for new drugs, which can often take well over a decade. Pharmamar is using the RSFF loan to advance the development and trials of innovative new drugs.

One of these is Aplidin®, an anti-tumour drug derived from a marine organism called a sea squirt and found in the Mediterranean; another drug under development is Zalypsis® which contains compounds derived from marine molluscs and sponges with great potential for the treatment of some uterine and cervical cancers.

Today, many thousands of patients in hundreds of hospitals worldwide are benefiting from Pharmamar's discoveries. The RSFF is helping take this effort forward and contributing to the competitiveness and success of the European pharmaceutical industry.

Project name: **Zeltia – marine pharmaceutical RDI**
Total cost: EUR 120 200 000
RSFF financing: EUR 30 000 000
Signature date: 7 May 2007
Beneficiary: Zeltia/Pharmamar
www.pharmamar.com

CASE STUDY

Keeping diabetes at bay

The World Health Organisation estimates that more than 180 million people suffer from diabetes and that by 2030 this figure will have doubled. Using RSFF funding, the Medinvest project, pooling several innovative SMEs, is investing in the vital medical research needed to combat diabetes and other diseases that concern many millions of sufferers worldwide.

If this study proves that the device really works for our patients – which I strongly believe – it will be a kind of revolution

Prof. Tarnowski

At Warsaw's Orlowski hospital, Professor Wieslaw Tarnowski is testing surgically implanted devices to help diabetes patients control their condition and live normal lives. 'The system we are currently testing has good chances of becoming an important treatment for type 2 diabetes,' he predicts. 'It avoids complications that are associated with ordinary diabetes treatments without forcing the patient to change his or her life completely.'

Type 2 diabetes is the most common form of diabetes – comprising 90% of sufferers – which results from the body's ineffective use of insulin. Over time, the disease can damage the heart, blood vessels, kidneys and nerves. The innovative new implant treatment, known as the Tantalus system, helps people with type 2 diabetes avoid insulin treatments and the associated risks. Implanted in the patient's gastric system, the Tantalus is triggered by gastric activity and sends electrical impulses to the brain during meals which help the person stop eating sooner and prepare the body to better deal with the subsequent rise in blood sugar levels.

SMEs at the forefront

This vital research is being replicated in clinical trials in Germany, Italy and Austria. It is supported by a EUR 30-million RSFF loan awarded to the Medinvest consortium made up of five medical technology SMEs. In addition to Metacure, Impulse Dynamics is developing electrical therapies for the treatment of chronic heart failure; Spectrum Dynamics is developing an innovative high-definition functional imaging technology that provides high-speed, high-resolution nuclear images; Motorika develops robotic technology to meet the therapeutic needs of stroke patients; and Core Dynamics develops technologies and products for cell, tissue and organ cryopreservation, including freezing and lyophilisation (freeze-drying) of cells and long-term banking of tissues and organs.

The medical technology sector is dominated by research-driven small- and medium-sized enterprises that combine cutting-edge expertise in engineering and clinical practice. Yet their size presents difficulties for them to obtain the upfront investments needed to turn their ideas into practice – in particular, the expensive later-stage clinical trials. The Medinvest consortium is tackling this problem by taking a portfolio approach and investing in five medical technology SMEs in Europe and Israel.

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Ageing populations and the increased occurrence of certain diseases is driving the demand for these innovative products

Ageing populations and the increased occurrence of certain diseases is driving the demand for these innovative products which will offer welcome relief to many millions of sufferers worldwide, as well as contributing to the success and competitiveness of EU enterprises.

Project name: **Medinvest**
Total cost: EUR 229 000 000
RSFF financing: EUR 30 000 000
Signature date: 25 November 2008
Beneficiary: Medinvest
www.metacure.com, www.impulse-dynamics.com, www.spectrum-dynamics.com, www.motorika.com, www.coredynamics.com

Next to Nobel

In Sweden, a public-private partnership (PPP) is replacing a well-known but no longer efficient hospital complex with a state-of-the-art hospital where first-class health care will go hand in hand with advanced research.

The Karolinska University Hospital is one of Europe's largest where thousands of doctors, nurses and ancillary staff provide first-class care for patients from the Stockholm area of Sweden. Yet they do so on a hospital site that is spread over a square kilometre and consists of dozens of separate buildings dating from the 1940s and 1950s. While this infrastructure has been continuously upgraded over the years, it is not the most efficient way of delivering top-class health care in today's world.

New Karolinska Solna will be a hospital with fully integrated patient care, research and education...

Annelie Liljegren, Medical Director, New Karolinska University Hospital

This is why the 'New Karolinska Solna' hospital project represents a radical new departure. Backed by a EUR 300-million RSFF loan, this project is the first-ever public-private partnership in the hospital sector in the Nordic countries – an innovation in itself, and an innovative project in many ways. The partnership includes the construction company Skanska, Innisfree, an infrastructure investment group, Coor, a service management company and Stockholm County Council.

The project promoters are building a new hospital, a single compact structure that will house all the services and departments that are currently scattered over the old site. And delivery standards will be high: patients will have their own single rooms and – apart from accident and emergency cases and post-operative care – specialists will come to patients, not the other way around.

'New Karolinska Solna will be a hospital with fully integrated patient care, research and education, which will help us compete with all high-quality hospitals around the world,' says Annelie Liljegren, the hospital's medical director.

A location with innovation

Across the road from the new hospital is the Karolinska Institute Medical University – the body that awards the Nobel Prize for medicine and a world-class research centre in its own right. By linking the hospital with the Karolinska Institute, the promoters hope to create a life science cluster that will combine basic medical research with world-class clinical research, and frontline teaching – which will benefit patients through the rapid transfer of new knowledge and techniques.

'The relationship with the hospital is very important to us,' explains Harriet Wallberg-Henrikson, Head of the Karolinska Institute. 'When we have discoveries and new results, we need to transfer them to health care.'

And it is not only patients and research that will benefit; situated in the border region of the Stockholm and Solna municipalities, this project will help regenerate a relatively neglected urban area and bring more prospects to the region as a whole. It will also contribute to the goal of the Stockholm region to be a leader in life sciences.

© Tengbom/Skanska/New Karolinska Solna University Hospital

Project name: **New Karolinska Solna PPP**
Total cost: EUR 2 215 000 000
RSFF financing: EUR 300 000 000
Signature date: 30 June 2010
Beneficiary: Swedish Hospital Partners
www.nyakarolinskasolna.se

CASE STUDY

An ecosystem for open innovation

At Philips headquarters in Eindhoven, the multinational hosts a high-tech campus with over 7 000 researchers, developers, and entrepreneurs co-operating in an open innovation framework to create the advanced products and services of tomorrow. The EIB is supporting this 'innovation cauldron' with a EUR 200-million loan to stimulate RDI in the field of new medical devices.

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'The brainiest square kilometre in the Netherlands,' is how Rick Harwig, former chief technology officer at Philips headquarters describes the campus. 'A complete ecosystem of people who contribute in one form or another – but not a closed ecosystem, because universities, research institutes, contract research organisations and SMEs around the world are also part of the scientific network.'

Originally created as a site to bring together the Philips R&D units that were scattered throughout Eindhoven, the heightened interaction and creativity it allowed convinced the company to throw the campus open to others in 2003. Today, it is home to 90 RDI-intensive companies – including many SMEs and start-ups – active in the fields of microsystems, embedded systems, life sciences and 'infotainment'. As well as a stimulating RDI environment, the campus offers access to R&D laboratories, business services, and incubators – and over 6 000 square metres of the site are reserved for start-up companies.

Supporting a vision

Medical technologies are one of the core RDI fields on the campus. This is why the EIB is supporting Philips' vision for the high-tech campus with a EUR 200-million RSFF loan to stimulate research and development targeting new medical devices.

One of the campus residents is Priv-ID. The spin-off develops privacy-compliant storage for biometric information, such as smart-card health passports. 'Start-ups cannot have essential functions like legal services, accountancy and patent registration in-house', explains Priv-ID manager Alty van Luijt, 'but all of these are available on-campus. Here, talent and the relevant services are at hand – software specialists, office space, you name it.' As part of the open innovation initiative Philips Research makes its expertise available, allowing SMEs to carry out advanced research in the most effective and efficient way.

The high-risk nature of much of the campus research is a key element in the EIB decision to approve the RSFF loan. 'R&D is inevitably a matter of trial and error, it is a long-term, high-risk game,' explains Mr Harwig. 'It is extremely profitable [when successful] but we fail 90% of the time. That means you have to prepare yourself for failure. For that, you need risk management and you need special financial partners who are willing to take that risk.'

> ***The EIB is an ideal financing partner especially as our R&D projects require long-term, sustainable commitment and funding***
>
> Rick Harwig, former chief technology officer Philips

© Stephen Coburn, Shutterstock

Project name: **European Medtech R&D**
Total cost: EUR 413 000 000
RSFF financing: EUR 200 000 000
Signature date: 30 October 2009
Beneficiary: Royal Philips Electronics
www.hightechcampus.nl

Innovation on the big screen

A Belgian SME is developing and marketing the digital technologies that are taking Europe's cinemas into the digital age. The company XDC is rolling out new cinema systems every week that bring better images to audiences, more powerful and versatile projection systems to cinema operators, and a raft of new possibilities for film studios.

Despite being small, XDC in Belgium has managed to establish itself as a leading cinema service company in Europe, based on digital cinema technologies. Usually it is larger organisations that develop or adopt new technologies first, and only later do they filter down into personal and domestic applications. Yet in the world of digital cinema the opposite has happened – while homes and offices have quickly equipped themselves with digital screens and projectors, high street cinemas and multiplex movie centres are trailing – with many still relying on 35mm film reel technologies.

XDC is changing this with a unique business model that has already led to over 1 000 digital cinema systems being installed in 11 European countries. XDCs rapid expansion is supported by a EUR 65-million RSFF loan, co-financed by commercial banks, which will help the technology-led company strengthen its R&D efforts and accelerate the implementation of its business model.

Indeed, of only 65 employees in total, almost one-third work in RDI activities – so the company is a true innovator.

Europe-wide roll-out

XDCs business model involves financing the installation of digital projection systems in cinemas – often SMEs themselves – by charging the movie studios a fee for each new digital film release. This means that the studios benefit from the better film quality and easier distribution via hard drive or even satellite, as well as other new services. The cinema owners benefit from access to the latest technology at a low cost, while film-goers win from the better image quality and the possibility of a range of new experiences, such as 3D films.

There is a lot of technology behind it. We have to make sure each system works perfectly – that's the challenge in this kind of industry

Serge Plasch, XDC CEO

'Only two years ago we signed significant agreements with the major Hollywood studios. Today we are rolling out digital systems in Europe, providing several screens every week with the necessary know-how and equipment to go digital,' explains XDC CEO Serge Plasch. 'And with this EIB loan we can finance more than 2 000 [additional] screens across Europe.'

The RSFF loan in this competitive and technology-led segment also seems to have had an important 'signalling effect' as XDC has concluded a number of major digitalisation deals since the loan contract was signed in early 2010.

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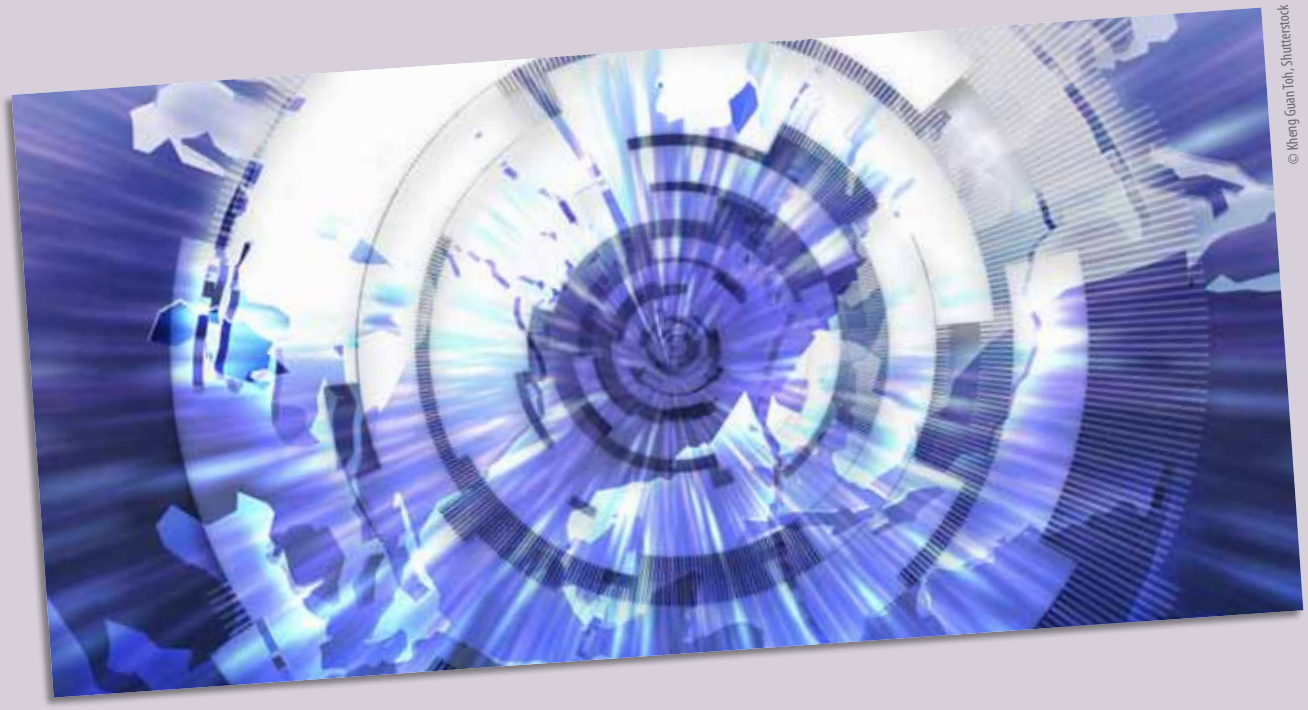
Project name: **European Cinema Digitalisation**
Total cost: EUR 130 000 000
RSFF financing: EUR 65 000 000
Signature date: 12 February 2010 (first tranche)
Beneficiary: XDC
www.xdcinema.com

CASE STUDY

High-speed internet for Turkey

Access to fast internet and the services it can offer is vital to economic and indeed social development. An RSFF loan to Türk Telekom is allowing the company to bring forward substantial internet infrastructure investments and connect more than 1.6 million new subscribers to the information highways linking Europe and beyond.



As an accession country, Turkey is receiving significant funding from the EIB to finance physical infrastructure as well as less tangible investments in the economic sectors needed to support development and growth. Turkey actively participates in EU R&D projects in the Seventh Framework Programme for Research, Technological Development and Demonstration activities, as an Associated Country. Against this background, the country's main fixed-line telecommunications provider, Turk Telekom, is investing heavily in improving and spreading broadband access throughout the country. Yet considerable investments are still needed to improve the telecommunications backbone in this large country. An RSFF loan of EUR 100 million for the Broadband Turkey project is helping Turk Telekom speed up the deployment of its expanding fibre-optic network to the furthest cities and regions.

Access to innovative services

In taking broadband internet to regional cities and rural areas, Turk Telekom is laying the foundations for economic and social development. The RSFF loan will support, in particular, work to improve access to the high-speed network, such as 'fibre-to-the-cabinet' projects, in metropolitan and rural areas.

Access to fast internet and the services it can offer is vital to economic and indeed social development

The investment includes upgrading existing copper lines as well as new installations of fibre-optic cable connections for areas of high demand, such as urban areas. This will allow homes and businesses to enjoy the social and commercial benefits that the information highway brings. Furthermore, as other telecoms service suppliers are allowed access to Turk Telekom's network, it is expected that competition will encourage equal access and an innovative range of internet-based services relevant to the needs of the different regions.

Overall, the RSFF loan is helping to bring around 1.6 million more subscribers online with true broadband speeds much faster than was planned. In numbers, the Turk Telekom strategy is to add 950 000 'fibre-to-the-cabinet' ports and 300 000 'fibre-to-the-building' ports, connected through 15 000 kilometres of new fibre-optic cable as well as upgraded copper connections.

Project name: **Broadband Turkey**
Total cost: EUR 626 000 000
RSFF financing: EUR 100 000 000
Signature date: 15 April 2010
Beneficiary: Turk Telekomuenikasyon AS
www.turktelekom.com.tr

Space: boosting next-generation satellites

With RSFF support, Europe is preparing for the 2012 launch of Alphasat — one of the world's largest telecommunications satellites and the first to use a new high-power satellite platform developed in the EU. This research infrastructure will offer better performance for a whole spectrum of space-based communications needs as well as several technology platforms for use by the EU research community.

Space-based satellite communications systems have delivered massive benefits to people and organisations which operate in areas of the globe where terrestrial-based coverage is poor or lacking. Emergency disaster relief, humanitarian aid, shipping, aviation and mining exploration are just some of the activities that gain from the speed, security and coverage modern satellite communications systems offer.

The Alphasat mission will take these benefits to a new level — well beyond the capabilities of existing satellite platforms — by extending high-speed voice and data communications to remote parts of Europe, Africa and the Middle East. Alphasat is a joint project of the European Space Agency (ESA), the French national space research organisation (CNES) and Inmarsat, a UK-based, European satellite telecommunications company.

Alphasat will help Europe's space industry to innovate, contribute to jobs in the knowledge economy and bring much-needed services to people in remote regions. It will be a symbol of the Europe 2020 strategy in orbit

Commissioner Máire Geoghegan-Quinn

Space for research

Growing market demand for better satellite communications services led EADS Astrium and Thales Alenia Space, both European leaders in space-industry technologies, along with the ESA and CNES, to develop Alphabus — a satellite platform offering higher powers and higher payloads that can accommodate the telecommunications, TV broadcast, multimedia and internet service payloads needed in the future. The Alphasat mission will place the new platform into earth orbit in 2012 using an Ariane 5 launcher. As well as offering communications services, this first research infrastructure supported by RSFF is adopting an 'open access' approach for research organisations by housing several technology demonstration platforms. These are being developed by EU universities and space organisations active in aeronautical, land and maritime research. They include an advanced laser communications terminal and a facility to measure the effect of radiation on electronic components and sensors.

With a total price tag of EUR 598 million and carrying all the risks associated with space activities, Alphasat was a clear candidate for RSFF funding — in particular because of its research potential. This is why the EIB provided Inmarsat with a RSFF loan of EUR 225 million towards the construction and launch of the mission.

'This confirms the EIB's long-standing support to Europe's space industry,' said EIB President Philippe Maystadt about the funding decision. 'It will put European industry in a leading position in this segment and could bring significant spill-over effects for research and innovation in Europe.'

© ESA, J. Huart

Project name: **Alphasat**
Total cost: EUR 598 000 000
RSFF financing: EUR 225 000 000
Signature date: 22 April 2010
Beneficiary: Inmarsat plc, United Kingdom
www.inmarsat.com

CASE STUDY

Solar power: investing in sunlight

A partnership of Spanish and German companies used RSFF funding to build the latest generation of solar thermal power plants in Europe. Incorporating innovative technical approaches, the Andasol project raises operating efficiencies and reduces costs, thus helping meet EU targets for renewable energy sources and combating climate change.

The special-purpose vehicle Andasol-1 Central Termosolar Uno S.A. is a partnership between ACS from Spain and Solar Millenium AG, a German technology company specialised in large-scale thermal power plants. Supported by an RSFF loan, they constructed the first large-scale commercial solar thermal power plant in Europe – Andasol-1, – which came online in the Spanish province of Granada in December 2008. This new power plant uses innovative parabolic trough technology which concentrates the sun's rays to produce heat that is converted to electricity.

Andasol-1 consists of many rows, each several hundred metres long, of precisely aligned, six-metre-high parabolic troughs. These act as mirrors to focus sunlight on to a pipe carrying a fluid which is heated to around 400 degrees centigrade. The fluid flows along the pipes and into a steam turbine facility where its energy (heat) is extracted and converted into electricity. There are over 7 000 collector elements in Andasol-1 producing around 50 megawatts (MW) of electricity. Production even continues after sunset or when it rains owing to an innovative heat-storage technology developed by the partners which uses molten salt to store heat and release it gradually during the night.

At the time of completion, Andasol was the first large-scale commercial thermal solar power facility in the Europe, covering 1.5 million square metres – equal to 210 football pitches

Powering innovation

Andasol-1 is one of the flagship projects of the RSFF. Incorporating European innovations into solar power generation, the RSFF helped the industrialisation of a new European technology, which involved many other EU companies in its development and construction.

The success of the RSFF-supported Andasol-1 demonstrator led directly to plans for expansion. Andasol-2 has been built and commissioned and the EIB has since financed other innovative CSP projects, such as Abengoa's PS 10 and PS 20, Solnova 1 and 3, Gemasolar and a number of additional operations in this sector which are under preparation. Significantly, much of this expansion is funded by private-sector sources of finance – demonstrating the leverage effect of the original RSFF investment.

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Andasol is the first large-scale commercial thermal solar power facility in Europe, covering 1.5 million square metres – equal to 210 football pitches – and can potentially produce an average of 150 gigawatt hours of electricity a year. When running at full capacity it can supply up to 40 000 households with reliable and environmentally friendly electricity, and it supports the peak energy demands seen during the summer months in southern Spain usually due to increased use of air-conditioning units.

The solar power technology successfully demonstrated in the original Andasol-1 project is also being exported around the world by the companies that developed it, with plans for installing over 2 000MW of plant worldwide utilising this innovative approach.

Project name: **Andasol Solar Thermal Power 1 & 2**
Total cost: EUR 594 000 000
RSFF financing: EUR 120 000 000
Signature date: 22 June 2006
Beneficiary: Andasol-1 Central Termosolar Uno S.A., Andasol-2 Central Termosolar Dos S.A.
www.solarmillenium.de

Powering sustainable transport

As a global supplier of car safety and power train systems to all major automotive manufacturers, the French and global firm Valeo plays a major role in making cars safer and cleaner. Valeo is using an RSFF loan to boost its RDI investments and keep the company, and Europe, at the forefront of power train technologies and active safety systems.

Around the world, vehicle manufacturers are striving to develop ever-cleaner and safer cars and trucks to meet increasingly stringent environmental legislation. In this effort they rely heavily on their suppliers' RDI activities to provide the components and systems for cleaner, leaner cars. One such supplier is Valeo, a world leader in the fields of driving-assistance systems, car transmission and electrical systems, thermal systems such as for engine cooling, and visibility systems including headlights. Valeo is a French company with a global presence: 56 000 employees, 117 production sites, 21 research centres and 40 development centres.

The company is at the forefront of RDI aimed at reducing fuel consumption, cutting greenhouse gas emissions and improving car safety. Its research focuses on developing more efficient, less fuel-hungry power trains that connect the car engine to its wheels; efficient transmission systems for the electric and hybrid cars of the future; and a range of improved security systems to make driving safer.

'Valeo is a key contributor in automotive innovation, paving the way for greener cars and efficient climate change mitigation measures.'

EIB Vice-President Philippe de Fontaine Vive

This research supports Valeo's long-term strategy which predicts that progressive urbanisation and ageing populations will drive demand, not only for smaller and cleaner cars, but also for more ergonomic cars that are easier to drive and park.

Accelerate existing research

The EUR 300-million RSFF loan secured by Valeo supports this vision, maintaining the company's leading position and building competitiveness. 'This funding is very important, particularly during the current [economic] crisis,' said Valeo CEO Jacques Aschenbroich at the loan signature event, 'and it will allow Valeo to continue and accelerate existing research projects aimed at improving fuel efficiency and active safety for vehicles.'

Valeo's RDI is contributing to its customers' effort to meet CO_2 emission legislation, and it also supports the European efforts to fund the development of new-generation vehicle technologies.

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© Oleg Kozlov, Shutterstock

Project name: **Car efficiency and safety RDI**
Total cost: EUR 645 000 000
RSFF financing: EUR 300 000 000
Signature date: 30 July 2009
Beneficiary: Valeo
www.valeo.com

CASE STUDY

Cleaner and leaner scooters

Quicker, safer and cleaner two-wheeled travel is the objective of Piaggio's RDI efforts. While retaining the reputation of its scooter and motorbike brands — such as Vespa and Aprilia — the company is using an RSFF loan to help replace two-stroke engines in its iconic two-wheelers with newly developed hybrid and electric versions.

With headquarters in Pisa, Italy, the Piaggio Group is the largest European manufacturer of two-wheeled motor vehicles and one of the world's leaders in the sector. Its product range includes scooters, mopeds and motorcycles from 50 to 1 200 cubic centimetres and it also operates in the light transport sector. In 2009, the company sold more than 600 000 vehicles worldwide, of which over 400 000 were two-wheelers.

Piaggio has been making scooters for decades, but much of its legacy lies with two-stroke machines. More recently, Piaggio's high-end two- and three-wheelers have used cleaner, efficient four-stroke engines, and now the company is using a EUR 150-million RSFF loan to improve emissions and fuel economy even further by using hybrid drive-trains and electric motors for its scooters.

In the spring of 2010, this research led the company to launch its first three-wheel hybrid scooter which combines the longer range of an internal combustion engine with the lower emissions and greater low-down acceleration of electric motors.

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The age of the scooter

Piaggio's R&D is focused on two main goals: developing higher-performance and environment-friendly engines, and improving vehicle features and safety. The purpose of this is to promote the use of two- and three-wheeled vehicles, especially in congested urban environments where they can offer much reduced travel times, up to 65% less fuel consumption and close to 75% less CO_2 emissions. And it is not only lower costs and emissions that are in the spotlight. Safety is an important issue the company is addressing through research into innovative braking and suspension systems, as well as new electronic vehicle dynamic control systems.

Piaggio Group's research is oriented towards the most advanced technology sectors, such as the engineering and manufacture of hydrogen-fuelled engines with fuel cells

For the longer term, Piaggio Group's research is oriented towards the most advanced technology sectors, such as the engineering and manufacture of hydrogen-fuelled engines with fuel cells; this is the most promising technology to achieve the company's 'zero emission' goal. Significantly, the RSFF loan to Piaggio contributes to the European efforts in support of RDI investments in the areas of emissions reduction and energy efficiency in the European transport industry.

Project name: **Piaggio R&D**
Total cost: EUR 327 000 000
RSFF financing: EUR 150 000 000
Signature date: 19 December 2008
Beneficiary: Piaggio & C SpA
www.piaggiogroup.com

Driving innovation

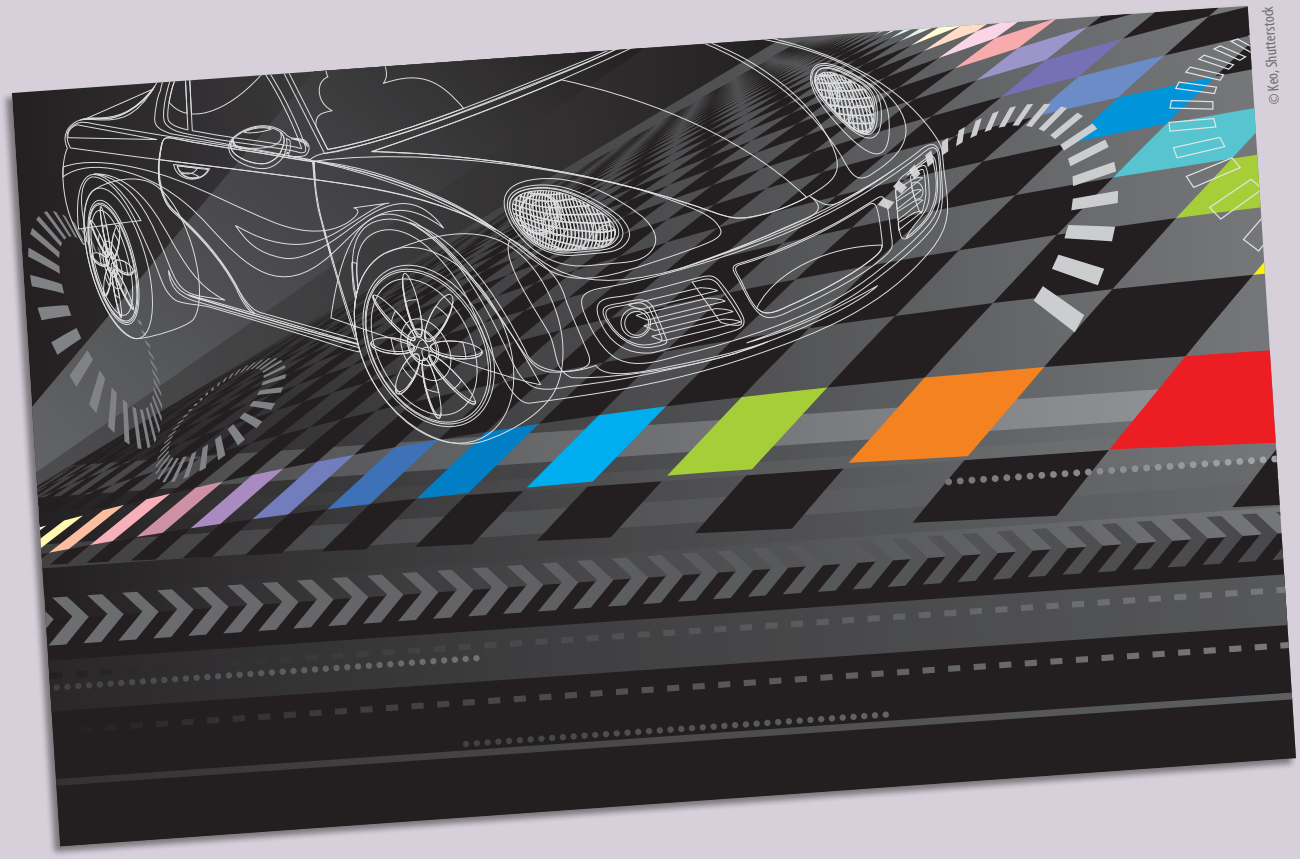
The Austrian company AVL is a global leader in automotive power train technology with a strong track record in providing research and development services as well as test/RDI equipment to car manufacturers worldwide. To support its RDI activities in developing more efficient, cleaner car engines, AVL has received a EUR 30-million RSFF loan.

AVL has a 50-year history of providing innovative breakthroughs in this area, acquiring a strong reputation in fuel-saving technologies at the same time

As part of the EU commitment to reducing the consumption of fossil fuels and combating climate change, the automotive sector is one of the EIB priority sectors for funding. AVL is a technology and engineering specialist focused on power train technology – the transfer of the power generated by a car engine to the wheels. With around 3 400 employees, AVL has a 50-year history of providing innovative breakthroughs in this area, acquiring a strong reputation in fuel-saving technologies at the same time.

AVL has already participated in several EU-wide cooperative research projects. AVL is also a founding member of the Artemis Industrial Association that brings together universities, research organisations and EU enterprises to develop and implement embedded electronic technologies in industrial and consumer applications, including automotive applications for better engine management and reduced emissions.

The EUR 30-million loan from the RSFF is used by AVL to develop cleaner and more efficient power train technologies that will reduce greenhouse gas emissions and contribute to reducing the impact of transport on climate change. The loan also funds research into hydrogen fuel technology, nano-composites and more efficient engine technologies.



Project name: **Powertrain R&D**
Total cost: EUR 130 000 000
RSFF Financing: EUR 30 000 000
Signature Date: 10 July 2007
Beneficiary: AVL List GmbH
www.avl.com

The RSFF in the wider landscape of financial support for RDI

The EU Research Framework Programme FP7 distributes some EUR 7 billion in grants a year during the period 2007-2013, much of this to support R&D within universities, research institutes and companies of all sizes.

Over the last decades, the EU has also designed specific financial instruments to ensure that RDI performers have access to the right type of finance at the right point in the innovation cycle — and the RSFF is playing an important role in this effort. In this section, other financial instruments developed at EU level are described, as non-exhaustive examples, in order to highlight the added value and complementarity of the RSFF.

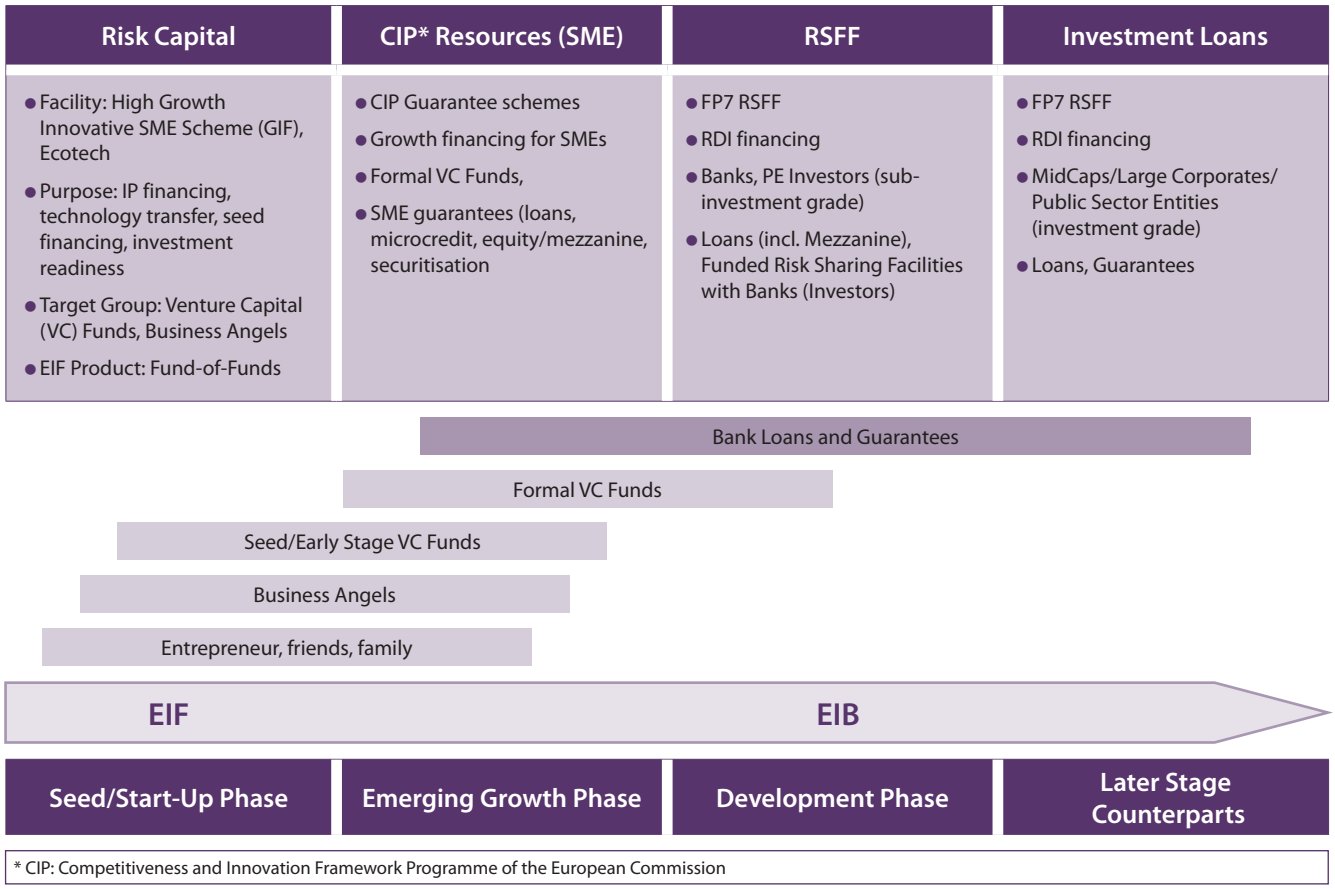
The chart in figure 8 sets out the innovation-cycle model and the EU financial instruments that entrepreneurial RDI performers can call on.

This model shows how growing, innovation-led companies broadly pass through three phases, each with their own financing needs — the seed/start-up phase, the emerging growth phase and the development phase, before reaching the more stable later phase of an established company able to obtain lending on normal terms from traditional sources. Of course, this model is a generalisation since the development of a project in a company and the development of a whole company are not the same; however, it serves to explain the global approach taken.

Figure 8 also shows some examples of the appropriate types and sources of finance a company might need at each stage. A start-up might use its own funds, loans from friends and family, or grants. For larger amounts, individual investors — known as business angels — may be called on, or seed capital from early-stage venture capital funds. In the emerging growth phase, bank loans or more formal venture capital funding are used to finance the higher costs that come with prototyping and pilot stages. For innovative products and innovation-led companies that reach the third phase (many do not), the risks are still present, but there is more certainty, and higher levels of funding are needed to roll out products and services to the market. More certainty and higher borrowing needs mean that bank loans and bank guarantees are in demand.

This linear model for the innovation cycle is a generalisation as individual cases may well depart from it and follow other funding pathways — nevertheless, many innovation-led companies do follow this pattern. This general model underlines RSFF added value — as a debt-financing instrument — to support innovation performers during the innovation cycle, to help them bring their new products and services to market.

Figure 8. EU financial instruments: support for companies at their various stages of development



Source: European Commission/EIB

The seed/start-up phase: supporting research

In addition to the FP7 project-based grants, other sources of finance have been developed to support SMEs facing this phase in the innovation cycle, notably through the European Investment Fund (EIF), part of the EIB Group. The objective is to ensure that innovative SMEs with high growth potential are not prevented from doing so due to a lack of finance. They also provide finance for the initial growth phase, thus helping entrepreneurs retain control of their innovations and avoid predatory buyouts.

The emerging growth phase: developing winners

Technology-focused companies (and notably SMEs) can be hotbeds of innovation as they seek the products, processes and services that will bring growth and expansion. Once past the research phase of turning new ideas into successful prototypes, more substantial funding is needed for the equipment and expertise to take the company forward.

It is here that the 'Competitiveness and innovation framework programme' (CIP) plays a role. Focusing on SMEs, it encourages competitiveness and innovation through providing support such as capital and loan guarantees. Sometimes called "the Valley of Death", this phase is crucial to ensure the viability of innovative companies. It is also an early phase where the development of the company can be aligned to future funding needs in later phases.

The development phase: going for growth

The RSFF described in this issue is an important source of finance for RDI activities with above average elements of risk. In addition to the RSFF, the EIB has a raft of additional funding instruments that are available to innovative SMEs, financial intermediaries and other organisations.

EIB lending focuses on what goes by the name of the 'knowledge triangle' linking education, research and development and innovation. In 2010 alone, EIB lending to support these sectors totalled over EUR 16 billion. These loan volumes underscore the importance of EIB support to RDI in the EU. At EUR 16 billion in 2010, this represents over 20% of total EIB lending (EUR 71.8 billion) in the same year. Within this lending envelope, the RSFF plays a significant role owing to its focus on risk, leverage and bridging gaps in the finance market place.

Innovative regions: lending locally

At the regional level, European regions receive substantial EU support for innovation through the Structural Funds. Both in the less-well-off convergence regions and in the richer competitiveness and employment regions, innovation and entrepreneurship are Structural Fund priorities. Financial instruments have also been initiated, such as the 'Joint European resources for micro to medium enterprises' (Jeremie), a joint initiative of the European Commission with the EIF and the EIB aimed at financial intermediaries supporting the SME sector. The RSFF strongly compliments the existing European financial sources of funding, strengthening RDI at regional level.

This section has explained how the RSFF is an integral part of EU funding mechanisms that support innovative entrepreneurs, SMEs and companies making investments in R&D and Innovation. It offers strong added value in an overall strategy that supports the EU's strategic goals of smart, sustainable and inclusive growth expressed in the Europe 2020 initiative. The following section looks at the key challenges for the future.

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RSFF: funding the future

In 2010, an Independent Expert Group (IEG) conducted an interim evaluation of RSFF to compare the progress made so far against the original objectives. On the basis of its evaluation, the expert group also made recommendations on how the RSFF might contribute to future RDI funding in light of the Europe 2020 strategy and its strong emphasis on innovation as the key to building economic success and social well-being across the EU. Highlights of its conclusions are presented here.

The Independent Expert Group (IEG) in charge of the RSFF interim evaluation

The interim evaluation of the RSFF was conducted by a six-strong group of expert evaluators chaired by **Erika Mann** — a former Member of the European Parliament, senior fellow of the Atlantic Council and a Trustee of Friends of Europe. The other members of the group were:

Luc Soete (Rapporteur): Director at UNU-Merit, the United Nations University, Professor and Dean at Maastricht University and an adviser to the Dutch government on science and technology matters.

Frank Gannon: Director General of the Science Foundation Ireland.

Arnauld Hibon: Vice-President Head of European Parliament Affairs of EADS and Director European & NATO Affairs of Eurocopter.

Ewald Nowotny: Governor of the Austrian National Bank, member of the Governing Council of the European Central Bank and former EIB Vice-President.

Carmen Vela: Managing Director of Ingenasa, a biotechnology SME in Spain, and an advisor to the Spanish Minister of Science and Technology.

The expert group's report is based on detailed information provided by the European Commission and the European Investment Bank as well as interviews and field visits to projects that have benefited from RSFF funding.

The Independent Expert Group (IEG) evaluated the progress to date of the RSFF from several angles:

Relevant

On the question of relevance, the IEG described the RSFF as a major and significant success: it fully met and even exceeded its lending targets and the loans made successfully targeted EC/EIB sectoral priorities. The scheme successfully addressed market imperfections, in particular those brought to the world's attention during the financial crisis and credit crunch. *'The RSFF', the IEG notes, 'helped many European research-intensive firms to maintain RDI activities in a period of major financial stress.'*

Effective

Is the RSFF effective? The IEG noted the rapid roll-out of the RSFF over the 2007-2009 period. The IEG found that, despite the first-come first-served approach, the RSFF has proved effective in lending to a broad sectoral mix that covers the key FP7 activities. Furthermore, the RSFF has

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achieved appreciable leverage of additional RDI funding from private finance; and lending has been effective in funding a series of 'pathfinder projects' which can be replicated by other players in the same sector. The experts pointed out that RSFF had achieved very considerable results on an EU-wide scale in the three years since its launch, even above initial expectations: the initial targeted amount of loans for the period 2007-2010 (i.e. EUR 5 billion) has already been largely exceeded. In terms of total investment in RDI supported by RSFF loans, the experts mention that 'RSFF approvals exceed initial targets with leverage achieved end of 2009 reaching a factor 14 and triggering some EUR 16.2 billion of investments in RDI'.

Flexible

The IEG also welcomed the 'flexibility' of RSFF operations — noting that this is the best approach to managing an instrument that is still on a learning curve. As part of this, the group noted the operational changes that move RSFF operations further towards an even more customer-based approach which will improve efficiency and help the EIB and the EC meet the needs of a wider range of potential beneficiaries with different risk profiles and at different phases of development.

In demand

The financial success of the RSFF is significantly greater than might have been expected initially, the IEG reports. Highlights of discussions with beneficiaries revealed that the relative financial advantages of RSFF loans on the market, the long maturities, the ability to diversify funding sources, and the catalytic effect of EIB involvement on the confidence of other financiers were seen as drivers for taking RSFF finance. The group also emphasised that, although the RSFF has proved a valuable resource during the current financial crisis, the structural need for a debt-based RDI lending instrument – specifically for low- or sub-investment grade counterparts – had been evident long before.

And more is better

Awareness-raising on the RSFF has been actively developed since 2007 through a variety of channels and a total of 112 'events', such as conference presentations and roadshows. However, given the rising demand for RSFF-type funding, independent experts suggested that more needs to be done — for example, in encouraging new financial intermediaries and partner banks that could improve access to RSFF funding for SMEs and smaller projects. In countries with less RSFF take-up the IEG would favour closer co-operation with regional authorities and exploring the potential development of new forms of public private risk-sharing to meet RDI needs in regional development areas, possibly blending the budgetary resources from the Structural Funds and from financial institutions.

A major success

In conclusion, the IEG confirmed that the RSFF has proved a novel and successful approach to financing RDI projects on a risk-sharing basis and recommend it continue with increased budget for the current period up to 2013 — pending the European Parliament and Council's decision — and it expands in the future programming period. The experts underlined that *'the success of the RSFF has also been the result of the close collaboration between the EC and the EIB'*, quoting President Barroso who mentioned the RSFF as 'an excellent example to build on' in order to 'improve the blending between grants from the EU budget and EIB loans'. The IEG recommends that the EC and EIB should continue to pursue the deepening and widening of their joint financing activities in support of strategic RDI-intensive activities.

More financial intermediaries are also needed, whether banking or non-banking institutions, to increase the number and range of RDI-intensive SMEs as beneficiaries, and new ways to increase participation might be sought in co-operation with new national and regional partners. The experts recommend adapting RSFF features to address specific needs, notably of SMEs, and large research infrastructures. This might notably involve a different risk-sharing approach. The IEG also highlights the risk that a proliferation of many different RDI support schemes as part of the Europe 2020 strategy could be counterproductive — by making the product offer more complex for the market place — and recommends care should be taken to ensure synergies through the streamlining of EU financial instruments.

Interviews

Erika Mann

Chair of the Independent Expert Group in charge of the RSFF interim evaluation


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Erika Mann

'The EU has acquired much experience in deploying R&D grants effectively and we do it well, but more is needed — of course, we need grants, but in my experience there are many cases where a loan is more appropriate, such as when some clarity of long-term support is needed. And for these cases an RSFF loan is pretty much the perfect instrument — it leverages knowledge, it leverages private finance, and it has a return, money comes back, to be reused for other projects. This is why the RSFF is such a welcome development, not only for its own achievements, but also as a pathfinder initiative that shows the way for developing instruments to fund innovation.

'In the expert group we looked at ways to capitalise on those features of the RSFF which have made it such a success. We know there are other, riskier areas of innovation that could be tackled, for example in the wider area of broadband technologies where there are so many bright ideas looking for funding. In co-operation with the EC and with EU budget support, the EIB could use its impressive technical knowledge in this area to close the gap with classical venture capital funds — making the funding pathway seamless.

'And SMEs need more attention — the RSFF has only been operating since 2007 and getting SMEs on board will take longer; this is to be expected as they are difficult to reach. RSFF funding going to SMEs should increase over the next few years, either as direct loans for those able to take them on, or in portfolio arrangements involving several SMEs if this would be more effective. And this is urgent as the economic crisis could last for several years more than originally thought — so if growth is expected to help us exit the crisis then investments in SMEs are needed.

'This will mean getting national banks with a local presence to act as intermediaries — when an SME wants a loan it goes to its own bank where there is a relationship of trust. We must reach out to these banks and persuade them to take on more risk, which is where the EIB's technical expertise in assessing risk comes into play. Such a network of national and even regional banks with expertise in this field, working with the EIB, could achieve wonders in upping innovation performance across the EU as well as leveraging large volumes of private finance for RDI.

'This regional focus then leads on to our suggestions about working with the Structural Funds in RSFF-type arrangements, for instance, to support innovation projects anywhere, in any sector in any region as long as there is an interesting proposition that can raise innovation performance and contribute to economic growth in the EU as a whole.

'Significantly, the RSFF is showing the way towards a better mix of funding for RDI in Europe. Showing how EU funding from the Commission can leverage higher levels of private investments by supplying the expertise — through the EIB and EC partnership — that gives lenders the confidence to get involved. This has the potential to change the RDI financing landscape in Europe for the better.'

Luc Soete

Rapporteur of the Independent Expert Group in charge of the RSFF interim evaluation


© Luc Soete

Luc Soete

'Mixing public and private sources of funding in the way the RSFF does is a delicate business, but it's proving a very successful mechanism. The RSFF has provided added value particularly as an "anti-cyclical" funding source during the economic and financial crisis. When this crisis unfolded, the market imperfections with respect to loan finance for RDI investments became, to some extent, ubiquitous. The RSFF remained one of the few financial instruments available to innovative firms and organisations to maintain their RDI activities. Thus, it helped some of the most innovative firms in Europe to keep investing in RDI and to reinforce their financial position at a time when banks and other financial institutions were reducing access to finance for high-risk investments.

'The RSFF has also provided loan finance to some innovative SMEs not interested in private equity funding. The RSFF should support even more RDI-intensive SMEs, as also underlined by Erika Mann. For example, we welcome the outline proposal of a FRISBEE scheme (Facility for Research and Innovation by Small Business Enterprises in Europe) providing EU technology-driven/innovative SMEs with a single and more adapted scheme to support them all the way from the generation of knowledge to commercialisation and involving specialised national or regional financial institutions. So far it is only work in progress; however, it may be developed as a future instrument that better combines grants and financial instruments to address the specific concerns of SMEs. Small and medium-sized firms could submit a proposal through an open application; IPR, often very important for SMEs, would be granted; and support could be provided through a possible combination of grants and landing/equity finance/participation/mezzanine finance, etc.

'RSFF can also be of interest in other areas of innovation support — regional development and cohesion funding are part of these. The paradox is that much of the EUR 344 billion of Structural Funding is lying idle, simply because many regions cannot find the matching funds needed to release it. And in addition, the Structural Funds — of which some EUR 86 billion is earmarked for supporting R&D and innovation — are divided up and managed on political criteria by the Member States and regions.

'This is where the RSFF and new funding instruments like it can show the way. If Structural Fund spending can be linked to private sources of funding with the involvement of private funding — seeking reasonably high rates of return — economic priorities would notably be better accounted for. The success of the RSFF poses the question whether we can design something similar to leverage Structural Funding and to make it more effective in supporting innovation. To do this, the involvement of the EIB Group would be critical, with an intermediary network of local and regional development banks which could act as funding bridges to local and regional projects.

'The significance of the RSFF is that it shows a way forward, a possible way to mobilise private investments, notably in regional innovation and key RDI sectors. Greater synergy and complementarities between sectors and financial instruments and funds should be targeted. To build on the RSFF's success, a more integrated approach of financial instruments would be welcome, while keeping the RSFF's positive impact on challenging RDI sectors.'

Scaling up the RSFF in the future

The Independent Expert Group (IEG) assembled to evaluate the RSFF also offered reflections on its future and its place in the areas of central importance to Europe's long-term growth, as defined in the Europe 2020 strategy. Their reflections cover the future scale of the RSFF — should it do more or less of the same; and its scope — expanding it to better serve the objectives of the European Union. Echoing this recommendation, on 4 February 2011 the European Council invited the Commission to present proposals by the end of 2011 for the scaling up of the RSFF.

A case for expansion

The positive interim evaluation convinced the IEG that the RSFF should be continued beyond 2013 and become a main instrument of the forthcoming European support programme for research and innovation with increased funding from the European Union. Citing the significant impacts and substantial leverage it has achieved to date, the IEG proposes a significant increase in the EU contribution to RSFF for 2014-2020. The reasons for this concern the coverage of RSFF lending. Several sectors and specific groups may be better represented according to the IEG — citing SMEs and research infrastructures — and substantially higher demand can be expected given the highly visible success so far. Furthermore, the IEG also suggests that the average risk profile of RSFF lending should be raised to meet the demands of specific market niches. In a time of crisis, the danger is that private RDI investment levels in the EU, which are already lower than that of other economies, will fall further. The leverage that the RSFF achieves can help prevent this and further boost Europe's competitiveness vis-à-vis major emerging economies.

A broader scope

The FP7 risk-capital contribution is a unique feature of the RSFF and opens other similar opportunities for combining public and private resources in different risk-sharing arrangements. Solutions to the 'grand challenges', such as climate change, energy security and demographic change, all need funding. The IEG gave sustainable energy technologies — such as low-carbon technologies — but also many other areas, such as health and ageing, digital applications, agri-food, and climate biodiversity, as examples. Substantial new investments will be needed in this sector over the coming years and a much larger and renewed RSFF will be needed to fund these.

The IEG also proposed a new regional scope — whereby forms of risk-sharing facilities blending Structural Fund resources with lending from the EIB or other intermediaries — could help raise the effectiveness of regional policies and in particular regional RDI investments. The Structural Funds have substantial resources for RDI — new forms of deploying these funds based around risk sharing could encourage more effective investments in RDI with better long-term impacts on local economies. Such an approach would be particularly helpful in regions where local banks remain unwilling to invest in riskier projects.

Europe 2020: the Innovation Union and the RSFF

In June 2010, at the initiative of the European Commission, the European Council adopted the European 2020 strategy — a vision of Europe's social market economy for the 21st century. At the core of the strategy are three priorities: smart growth, sustainable growth and inclusive growth. One of the main objectives of its 'Innovation Union flagship initiative' is to increase access to finance. To achieve this, building on RSFF success will be key.

'Achieving the target of investing 3% of GDP in R&D activities, in particular by improving the conditions for R&D investment by the private sector' is a headline target of the Europe 2020 strategy. And it is one that will be monitored closely in the future as the EU strives to match the levels of RDI investments seen in the US and Japan. Meeting this 3% target could create 3.7 million jobs and increase annual GDP by up to EUR 795 billion by 2025.

A flagship initiative

The Europe 2020 strategy contains seven flagship initiatives to catalyse progress towards meeting the three priorities. One of these initiatives — the Innovation Union launched in October 2010 — sets out a strategic approach to innovation, driven at the highest political levels. The Innovation Union will focus Europe's efforts on challenges like climate change, energy and food security, health and an ageing population. Significantly, it will use public-sector intervention to stimulate the private sector and to remove bottlenecks which keep ideas from reaching the market.

'The Commission will bring forward measures to improve access to finance. It will propose a cross-border venture capital regime, work with the European Investment Bank to scale up EU schemes like the Risk-Sharing Finance Facility, and appoint a leading figure to strengthen cross-border matching of innovative firms with investors,' the EC announced at the launch of the Innovation Union initiative, which pointed to the more than 20-fold leverage the RSFF and other instruments have obtained, owing in large measure to the expertise and market standing of the EIB and the excellent EIB/EC co-operation.

Building on lessons learned

With this in mind, the Commission aims to develop rationalised and cross-policy financial instruments by 2014 that will close gaps in the funding market, leverage substantial amounts of private capital, and expand on the success of the RSFF. Building on the successful co-operation with the EIB, and working with national financial intermediaries and private investors, the Commission will propose ways of addressing other critical gaps, such as access to funding all along the value chain (from 'blue-sky' research to commercialisation) for innovative fast-growing SMEs/Mid-Caps with global ambitions. And in another echo of the recommendations of the RSFF interim evaluation, the Innovation Union initiative goes beyond filling the 'funding gaps' and highlights the danger of 'innovation divides' between the RDI performances of different EU regions. Financial instruments building on RSFF experience could contribute to improving the deployment of Structural Funds in support of innovation and implementing smart specialisation strategies in the regions.

A sea change in performance

In response to the Council conclusions of 4 February 2011, by the end of 2011 the Commission will also put forward concrete proposals for scaling up the RSFF and offering innovative answers to the financing needs of innovative companies. During 2011, as the EU economy moves out of the financial crisis, the Innovation Union initiative will evolve further — and this is an urgent matter, as the Commissioner for Research, Innovation and Science, Máire Geoghegan-Quinn said at its launch:

'As we emerge from crisis in the teeth of fierce global competition, we face an innovation emergency. If we do not transform Europe into an Innovation Union, our economies will wither on the vine while ideas and talent go to waste. Innovation is the key to building sustainable growth and fairer and greener societies. A sea change in Europe's innovation performance is the only way to create lasting and well-paid jobs that withstand the pressures of globalisation.'

Risk Sharing Finance Facility (RSFF)

The EIB and the European Union back research development and innovation

Investment in research, development and innovation (RDI) improves competitiveness, long-term growth and employment in Europe. The European Commission and the European Investment Bank support RDI through the Risk Sharing Finance Facility (RSFF).

European Investment Bank

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Risk-Sharing Finance Facility (RSFF)

http://www.ec.europa.eu/invest-in-research
http://www.eib.org/rsff

The RSFF is an innovative debt-financing instrument co-developed by the European Commission and the European Investment Bank for more funding for research, development and innovation in the European Research Area. Visit our websites to learn more about how RSFF works, what can be financed, who can benefit from RSFF financing, what financing products are available and how to apply, as well as to access the latest press releases, publications and multimedia items on RSFF.

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