

GERMANY

Science and Innovation

FACTSHEET No.5 (June 2009)

The Fraunhofer Society (Fraunhofer-Gesellschaft, FhG)

By Muzinée Kistenfeger (<mailto:research.berlin@fco.gov.uk>)

The Fraunhofer Society (FhG) is one of Germany's four non-university research organisations and focuses on applied research. It was founded in 1949. The current number of FhG institutes has increased to 58. They undertake contract research for the public sector, government, and industry, including small and medium-sized enterprises (SMEs), which lack the critical mass to carry out their own R&D. Directors of the institutes play an important role in the promotion of young scientists through university teaching. In recent years, the FhG has become one of the main advisers to government and industry on research-related issues, particularly on the commercialisation of new technologies and innovation.

Structure and Priorities

The Fraunhofer Society's headquarters are based in Munich. Professor Hans-Jörg Bullinger, the Society's President, also chairs the Executive Board of the FhG. The Senate, which comprises representatives from industry, science and government, sets research priorities and determines the allocation of resources to the institutes on the basis of advice from the Scientific and Technological Council (WTR). Since April 2006, the FhG also has a Managing Director for Research Planning, Dr. Ulrich Buller.

The Fraunhofer Institutes focus on ten priority areas:

- materials technology and component behaviour;
- production and enterprises;
- information and communications technology;
- microelectronics and microsystems engineering;
- sensor systems and testing technologies, photonics;
- process engineering;
- energy and construction technology,
- environmental and nature
- life sciences and health research;
- technical and economic studies and information transfer.

In order to maximise their potential, the FhG institutes form cooperative alliances, thus jointly offering their services on the market. Currently, there are seven cooperative alliances, which also advise the Executive Board on structural and business development within their research field. They are (figures for 2008):

- The Microelectronics Alliance is by now the largest strategic alliance within the FhG (11 institutes, total budget € 285 million)
- The Materials and Components Alliance (13 institutes, total budget close to € 283

- million, a 14% increase over 2007)
- The Information and Communication Technology Alliance (the largest IT research group in Europe composed of 15 institutes, with a total annual budget of ca. € 180 million)
- The Production Alliance (7 institutes, total budget ca. € 140 million)
- The Surface Technology and Photonics Alliance (6 institutes, total budget ca € 160 million)
- The Life Sciences Alliance (6 institutes, total budget € 95 million, almost 15% increase over 2007)
- The Defence and Security Alliance (5 institutes, total budget ca € 100 million including € 39 million funding from the Federal Ministry of Defence)

The FhG, formerly focusing mainly on engineering sciences, has also developed research capacities in the area of health and life sciences. Six of the Fraunhofer Institutes pooled their biotechnological expertise in a “Life Science Alliance”. They conduct research in the field of regenerative medicine, medical technology, pre-clinical and clinical research, production and safety of foods, and environmental research and protection. The goal of the alliance is to promote the industrial development of biotechnology and thus link basic research and industry production.

In terms of research strategy, the Fraunhofer Society is directing its efforts toward as-yet-undeveloped markets for products that might take over five years to mature. In the area of nanotechnology, the FhG institutes focus their research on nano-scale materials, nanophotonics, and nano-analytics. The Fraunhofer Centre Nanoelectronic Technologies CNT in Dresden is member of a newly established research platform for nanoelectronics, which received € 232.5 million of public funding from the European Commission. Other priority areas of research are mobility and energy technologies.

Since 2003, the FhG started playing a key role in an initiative of the German Federal Government to promote innovation. About every 3 years, FhG experts select and make public a series of twelve leading-edge technologies assessed as having a good future market potential. They also pinpoint areas of activity meant to facilitate innovation and the quick translation of ideas into high-quality products. FhG President Bullinger is a close adviser of the German government on technology issues and a member of the "Forschungsunion", the 16-members Advisory Group of the Federal Research Ministry.

Facts and Figures about the Fraunhofer Society (figures for 2008)

The Fraunhofer Society’s 2008 budget was € 1,401 million (£1=€1.18), an increase of 6% over 2007. The Fraunhofer Society has three main sources of income:

- Institutional funding provided by the federal and states (Länder) governments on a 90:10 basis, (a total of € 432 million in 2008 plus an additional € 38 million from the Federal Ministry of Defence.)
- Public-sector project grants from federal and states sources and the EU (€ 309 million, an increase of 13% over 2007. EU projects accounted for € 61 million)
- Industry funding from contract research (some € 452 million in 2008, an increase of 7% over 2007.).
- Others (investments, assets, etc. € 98 in 2008)

Close to two thirds of the FhG's annual budget of over € 1,4 million is covered by contract research carried out on behalf of industry, the state and public institutions. Public-sector project grants have only marginally increased in 2008 (some 5%), a trend which, the FhG management believes, will continue in 2009. Despite the difficult economic situation, income from industry contracts has achieved a modest increase of 7% in 2008. This process might stagnate in 2009. Industry income includes revenue from the MP3 and other licences (ca. € 83 million in 2008). Expansion investments however, declined compared to the previous year and only reached € 72 million. The Fraunhofer Society is a large and rather popular employer in Germany. It currently has increased its staff to close to 16,000 (some 1400 more than 2007).

Technology Transfer

Fraunhofer Institutes focus on applied research and development but an amount of strategic and precompetitive research is also undertaken. Research is usually conducted in the form of projects funded from public-sector grants or by industry, often SMEs. The latter include customer-specific solutions to companies' problems, for instance the adaptation of specific processes or technologies in accordance with company requirements. With an annual staff fluctuation rate of 10%, the Fraunhofer Society continuously transfers technologies and expertise into industry. The FhG has introduced three mechanisms to promote the transfer of research into industrial applications:

- Application Centres (Anwendungszentren) are based at individual institutes and form a platform for contract research for the specific needs of industry.
- Innovation Centres (Innovationszentren) seek to bridge the gap between applied R&D and the introduction of new products on the market. An innovation centre located in Bavaria specialises in telecommunications engineering.
- Demonstration Centres (Demonstrationszentren) combine the expertise of several Fraunhofer Institutes to improve the R&D infrastructure in priority areas. These centres also provide training opportunities and consultancy services for SMEs.

Patent and Licensing Activities

In 2008, the Fraunhofer Society filled 500 patent applications with the German Patent Office and raised its total number of German patents to 2400. Most of them come from the engineering and microtechnology areas.

In 2008, the FhG reported € 83 million of license revenue. The most successful license of the FhG is the MP3 licence. Alone, it generated € 100 million of revenue in 2005. The amount has decreased since. This year, the Society set up a *Fraunhofer Future Foundation* in order to manage this revenue. The Foundation has a basic fund of €5 million and will have at its disposal € 95 million in 2009 for project funding. Its role is to promote patent-oriented research projects in order to ensure future competitiveness and support the institutes in setting new trends of innovative research.

Spin-offs, Spin-ins and Expansion

The FhG boasts close to 50 spin-offs annually, mainly in such areas as information technology, life sciences, material research and environmental engineering. The Fraunhofer Venture Group was established in 1999 to support spin-offs by providing

counselling on start-up funding and business plan design. It also offers access to a network of consultants, venture capitalists and banks. The Fraunhofer Venture Group takes out partnerships, usually by providing technology licences. To a limited extent, it also provides seed capital. In 2008, it supported 41 spin-off projects.

The FhG also experiments with a new strategy: the spin-ins. The FhG Institute for Ceramic Technologies and Systems in Dresden for example, developed an innovative ceramic SOFC (fuel cell). Two industrial companies have now set up a joint new company within the Institute, Staxera, which will help drive the new product toward serial production. Staxera integrates staff from the FhG and is 100% financed by the project partners.

Portfolio and influence expansion is also a priority with the FhG. At the beginning of 2009, a new Institute for Wind Energy and Energy System Technology was established in Bremerhaven also including the previously independent Research Institute for Solar Energy in Kassel. In 2009, the three institutes of the Research Society for Applied Natural Sciences (based near Bonn) are to be integrated in the FhG.

International Activities

The FhG's revenue from international projects increased in 2008 to € 147 million. EU-funded projects generated € 61 million in 2008 but the total revenue from European sources was up to €113 million (an increase by 15% over 2007). Revenue from US research projects was of € 17.2 million and from Asia € 15.1million. The Fraunhofer Society has a US subsidiary, *Fraunhofer USA*, which operates 7 research centres from five locations. They focus on laser technology and laser applications, biomedical engineering, production technology, manufacturing innovation, software engineering and sustainable energy systems. The centres aim to transfer local expertise into the Fraunhofer Society and to increase its customer base overseas.

The FhG has also established five *Representative Offices* in South East Asia focusing on marketing and business expansion. Further *Fraunhofer Representative Offices* opened in Brussels and in Moscow. The FhG and its Brussels office were involved in the development of the EU "Strategic Research Agenda", which was used as a basis for defining the production technology area of FP7. In 2008, a new FhG Centre for Assistive Information and Communication Solutions (AICOS) was inaugurated in Porto, Portugal while two research centres were set up in Poland and Greece located at partner-universities in Wroclaw and Thessaloniki. In November 2008, the Society also set up a new subsidiary, *Fraunhofer Austria Research*, based in Vienna.

Looking ahead: future priorities and initiatives

- In order to promote networking and know-how transfer, the FhG initiated a number of "innovation clusters", networks built around one or several Fraunhofer institutes and involving academic research partners and industrial companies, mostly SMEs. The Fraunhofer Society and the federal and local state governments jointly fund these networks. The first four clusters cover mechatronics and machine engineering in Chemnitz, optic technologies in Jena, digital production in Stuttgart, and medical technologies ("Personal health") in Erlangen-Nueremberg. Three more clusters were set up in 2006: "Nano for production" in Saxony, "Automotive Quality" in the Saar and "Digital Automotive Technology" in Kaiserslauten.

- Another priority of the FhG in the next year is consolidating the beginning cooperation with the prestigious Max Planck society of basic research in order to better exploit synergies. In 2006, the two societies have started three long-term jointly-funded cooperation projects.
- FhG Institutes generally offer university graduates training opportunities in various technological areas. In 2006, the Fraunhofer Society in cooperation with several universities set up a *Technology Academy* offering master degrees in technology managing, logistic engineering, and environmental sciences. It targets young academics, who have worked at least 5 years in industry and have reached a managing level. The Technology Academy offers courses as of September 2006.

Further Information and Literature

English-language information on the Fraunhofer Society with links to all institutes is available on the Internet at <http://www.fraunhofer.de>. The FhG publishes a number of English-language brochures, including a guide to its research establishments and sectoral publications on priority research areas.

In 2009, the FhG published a 560-pages "Technology Guide: Principles - Applications - Trends". It comprehensively explains current and future technologies and covers a wide range of topics. The English-language volume costs € 80 and can be ordered on-line.

The Society also publishes a regular newsletter "Research news" and a bilingual German/English guide to its institutes on CD-ROM. The annual report 2008 is available in German. Copies of these may be obtained via the Internet or from:

Fraunhofer-Gesellschaft e.V.
Hansastraße 27c
80686 Munich, Germany
Tel: +49 89 1205 0
Fax: +49 89 1205 7531
E-mail: fraunhofer.presse@zv.fhg.de
or Info@fraunhofer.de

**Science and Innovation Section
British Consulate-General Munich
Möhlstraße 5
D-81675 Muenchen
Germany**

<mailto:science@british-embassy.de>
<http://www.britischesbotschaft.de/S&I>