



**Fraunhofer**  
ISI

FRAUNHOFER INSTITUTE FOR SYSTEMS AND INNOVATION RESEARCH | **VISIONS FOR DECISIONS**



ANNUAL REPORT  
**2008**



## FRAUNHOFER ISI

The Fraunhofer Institute for Systems and Innovation Research ISI investigates how technical and organizational innovations shape industry and society today and in the future. Trademarks are the systemic approach, the integration of research disciplines and the building of networks for innovations, together with clients and interested parties. With its expertise, experience and reports, ISI as one of the application-oriented research institutes in the Fraunhofer-Gesellschaft contributes towards strengthening European competitiveness.

At present, 160 staff are permanently employed at ISI, around 110 of whom have qualifications in the natural, engineering, and social sciences and economics. With an annual budget of circa 16 million euros, circa 280 research projects were conducted and circa 190 research reports were written for public and private clients in 2008. Mainly based on this contract research, ISI invites relevant stakeholders and experts to discuss trends and encourage mutual learning, thus supporting decision-makers in industry, science and politics in making strategic choices.

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## INTELLECTUAL MASTERMIND WITH RELEVANCE FOR POLITICS, THE ECONOMY AND SOCIETY

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We are pleased to present our Annual Report for the year 2008 to the interested public.

ISI's development was once again marked by challenging inquiries from the EU Commission, federal and regional administrations, and well-known German companies and associations. As an individual partner, but also in view of our multiple ties to the TU Berlin, the University of Karlsruhe, the Université Louis Pasteur in Strasbourg, ETH Zurich, Virginia Tech in the USA and the Institute of Policy and Management in Beijing, we are perceived in many ways as an intellectual mastermind with relevance for politics, the economy and society.

The Annual Report invites you to tackle the perspectives which ISI as one of the international leading innovation research institutes developed in 2008 for its large circle of clients. For communicating perspectives to address issues from systemically different viewpoints is the core of ISI's mission – technically neutral and deliberately multi-dimensional in methodology. At this point we should like to thank the management of the Philological Library of the Freie Universität Berlin, for their kind support in the photographic work in this report.

Among the main themes of the past year are the continuation of ISI's cooperation with the Research Center Karlsruhe as scientific partner of the Office of Technology Assessment at the German Bundestag (TAB), the "European Manufacturing Survey", preparatory studies for a post-Kyoto agreement, the debate about innovations in non-research-intensive enterprises as well as recommendations for action for research policy within the framework of the BMBF Foresight Process.

We are particularly encouraged by the support of our Board of Trustees in the formulation of the strategic guidelines up to the year 2015, as well as their implementation in strategic fields of action.



Among the other steps to ensure Fraunhofer ISI's ability to meet future challenges belong the introduction of a new, up-to-date doctoral program as well as the new cooperation agreements forged with notable research institutions in China and Russia, with the aim of further internationalizing ISI.

That we as a team of highly motivated and suitably experienced ISI staff members do justice to the requirements of our clients at the systemic, anticipatory, prospective and interdisciplinary levels – that is and remains our claim.

We are looking forward to further cooperate with you!

**Professor**  
**Marion A. Weissenberger-Eibl**  
Head of the Institute

**Dr. Harald Hiessl**  
Deputy of the Institute

**Dr. Stephan Bieri**  
Chairman of the Board of Trustees

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## NEW THINKING IS REQUIRED AND FEASIBLE

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**An intensive dialog between the management of the Institute and the Board of Trustees helps to determine Fraunhofer ISI's strategic direction in its forward thinking role for politics, industry and society. The following interview given at the beginning of March 2009 shows which side contributes which approaches in the process.**

**Interview with the Chairman of the Board of Trustees, Dr. Stephan Bieri, and Professor Marion A. Weissenberger-Eibl, Head of the Institute**

*From today's standpoint in March 2009, what in particular was significant about the work conducted at Fraunhofer ISI over the last year?*

**Weissenberger-Eibl:** Without putting other projects from our large range of activities aside, ISI's work in the fields of foresight, mobility and social security issues really stands out. The far-reaching implications of this work confirm our role as a visionary. However, another aspect which was at least as important, because of its future effects, was deepening our relations with China – both in the form of the institutionalized cooperation of ISI with the Institute of Policy and Management (IPM) of the Chinese Academy of Sciences, and through the agreement to extend our "European Manufacturing Survey" to include China from 2009.

**Bieri:** There were a lot of internal changes at ISI as well in 2008. The Board of Trustees was particularly impressed with the flat organization, which is seen as a strategic accent. And, personally, I am delighted with ISI's new role at the intersection of technological and entrepreneurial processes.

*How do you rate the influence of ISI's studies beyond Germany's borders? Where is this network especially strong – where should it grow?*

**Weissenberger-Eibl:** Fraunhofer ISI is one of the institutes which work continuously and particularly closely for the EU Commission. In certain sub-areas of our research topics, we are already perceived as a visionary by other countries, but I think

there is still room to improve. We need to work hard on this. Our presence is strongest where questions of climate change are concerned.

**Bieri:** ISI already enjoyed high international recognition in the past, with an emphasis predominantly on policy advice and R&D and technology management. However, the evaluation report of 2004 demanded wider international effectiveness beyond this level. With the strategy which has now been introduced, there is a realistic chance to set additional accents to address business management more actively.

**“THERE ARE MANY ARGUMENTS IN FAVOR OF ACTING EVEN AS THE SUPPLIER OF ISI PRODUCTS.”**

*In many projects, ISI heads the consortium, in others it acts more as a project partner, and in yet others it concentrates on accompanying the work as a project office. Where does ISI want to be seen and where does it want to operate more in the background?*

**Bieri:** The audit which has already been mentioned also prompted ISI to take on more of a contractor function as well. We know from innovation research that the realization of process and product innovations takes place neither schematically nor based purely on technology. Transverse actions go beyond the normal boundaries of technology and science. Therefore, the



Fraunhofer Associations and Alliances are obvious partners for ISI, which is endowed with both socioeconomic methods and industry's trust.

**Weissenberger-Eibl:** First of all, of course, our project sponsors define our respective role. This is why our contractual relations vary so much. However, there are many arguments in favor of acting even as the supplier of ISI products for selected types of results beyond contracts. This would be a new move for us, but is certainly in keeping with the times.

*Your credo is to support decision-makers from politics and industry with scientifically based visions. There is a many-tiered methodical approach behind this. How do you handle those aspects of a development which cannot be expressed in quantitative terms?*

**Weissenberger-Eibl:** We never look at just one dimension, be this economic, ecological or social. In many studies we were able to substantiate the assertion that popular theories about the contradiction of these dimensions cannot be upheld from the viewpoint of sustainability. Of course, we also use qualitative yardsticks here. We are not concerned with measurability *eo ipso*, but with the balanced evaluation of as many aspects affected by the topic as possible.

*What does a project sponsor have to consider when cooperating with Fraunhofer ISI? What can he expect, what not?*

**Weissenberger-Eibl:** We offer a scientifically sound analysis tailored to individual enquiries. Answers do not spring from standards, but from an extensive analysis of the respective context which often reaches beyond the preliminary aspects of the contract. Complaisance is out of the question here.

*ISI-topics are relevant at national if not indeed at European level. How does this fit with such a quiet setting as Karlsruhe?*

**Bieri:** I wouldn't call Karlsruhe quiet: the city is home to one of the eight German elite universities of excellence and an excellent Helmholtz research institution, the Forschungszentrum Karlsruhe. The newly founded Karlsruhe Institute for Technology KIT should create synergies and promote innovations which should suit ISI very well.

**Weissenberger-Eibl:** I would be prepared to discuss the expedience of our current location in the Breslauer Strasse, especially in view of the growth in our workforce ...

*You are now observing the innovative position of Germany from the multifold perspective of 23 Business Units. That looks like expansionist growth of ISI – or is this misleading?*

**“THE EXPANSION IS INTENDED BECAUSE WE CAN ONLY EXAMINE FUNDAMENTALLY DIFFERENT PERSPECTIVES IN THIS WAY.”**

**Weissenberger-Eibl:** Emphasizing clearly defined Business Units makes it clear to outsiders what has already been recognized for many years as a particular ability of ISI – with our demand for systemic work, we provoke a holistic view of social, political and economic issues. To this extent – yes, the expansion is intended because we can only examine fundamentally different perspectives in this way.

**Bieri:** Business Units in the case of R&D do not automatically mean products which is why they are also not a direct indication for fragmentation. I explicitly welcome the fact that ISI's own methods are being implemented in a whole series of fields.



*Many topics of ISI – sustainability, understanding innovation, assessing Germany’s production – appear very attractive to outsiders. Do job applicants have the same opinion? What are ISI’s strong points for young academics?*

**Weissenberger-Eibl:** Many of our new staff members are astonished at how much we actually do work in an interdisciplinary manner. Many see our practical orientation as a contract researcher and at the same time the freedom to be able to develop topics autonomously as a major point in our favor. The recently introduced position of Coordinator of Business Unit has opened up additional career opportunities at ISI and allows those selected to nurture specific topics and gather first experience with leadership responsibilities. Our PhD students encounter a newly designed doctoral model, a highly interdisciplinary and collegial working environment and also an above-average infrastructure.

## “OUR PHD STUDENTS ENCOUNTER A HIGHLY INTERDISCIPLINARY AND COLLEGIAL WORKING ENVIRONMENT.”

**Bieri:** In a competitive scientific institute, what really counts is the quality of the heads and the standard of the researchers. This, as my practical experience in Europe and the USA tells me, is what it’s all about. This is why I support the ISI management in their efforts to support PhD students and to put more thought into post-doctoral career planning. There is something really happening here.

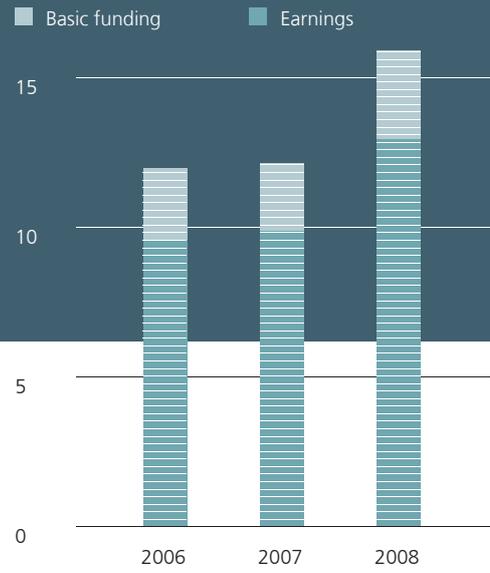
*What expectations do you have of the ongoing year in the middle of a difficult economic climate?*

**Weissenberger-Eibl:** Looking at the global, European and German economic development, we are currently surrounded by radical changes and discontinuity. The complexity of human social systems has reached such a remarkable extent that obviously new thinking is now required and also seems feasible.

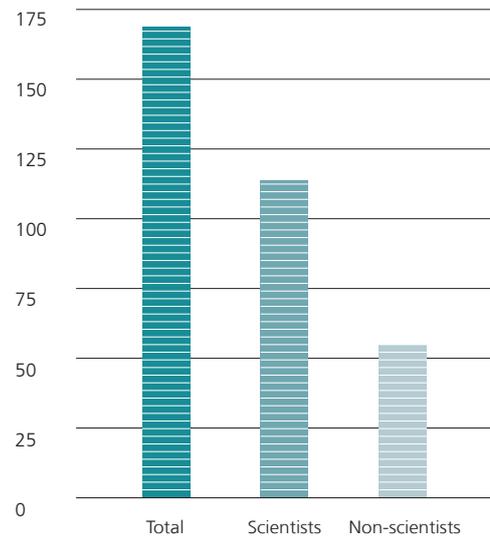
I see the conceptual barriers have been lowered for us and others. Within the scope of sustainable innovation strategies, we are allowed to challenge the terms of economic success with all our systemic competence.

**Bieri:** Quality and flexibility are especially important during a recession – at all levels. Naturally, this also applies to the Fraunhofer-Gesellschaft and to ISI.

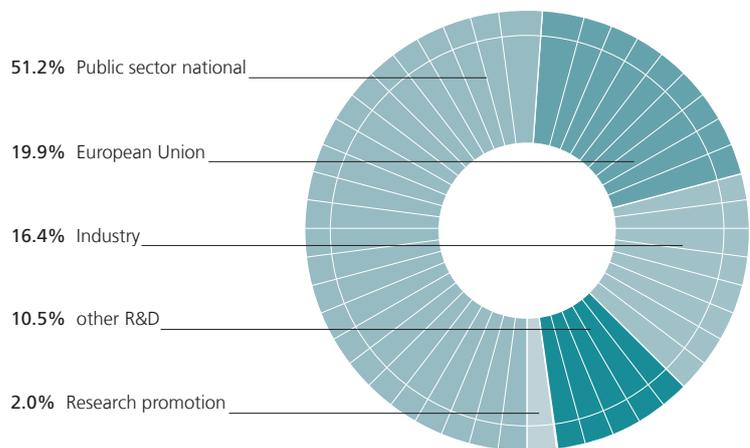
This interview was conducted by Sebastian Ziegeaus.



Development of turnover 2006–2008 (in million euros)



Number of staff



Clients

FOCUS THEME 1



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# PERSPECTIVES FOR WORLDWIDE COOPERATION

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*International innovation competition and global challenges call for cooperation in all areas: researchers also network across borders and cultures.*

Today, socially relevant research no longer takes place in a solely national context. International competition in innovation demands a visionary attitude and self-comparison with other regions. Only then is it possible to recognize and engage economic opportunities and challenges. How can research organize itself and network across national and cultural boundaries? How can Germany and Europe position themselves in the context of the economic globalization and the internationalization of the political decision-making process? How can the close international cooperation needed to meet the United Nations' Millennium Development Goals and fight climate change be organized? On behalf of international organizations, Fraunhofer ISI is pursuing these questions in a growing number of cooperative ventures and with participation in international combination projects.

## **International Problems Require International Solutions**

The international questions analyzed include dealing with the aspects of climate protection and security. For example, preparation of a post-Kyoto agreement depends on reliable information and sound facts as a basis for decision-making. Prognoses for an ambitious climate regime starting 2012 show that further reductions in greenhouse gas emissions are possible, given intelligent further pursuit of the mechanisms for environmentally friendly development. In security research, Fraunhofer ISI collaborates closely with its French partners at the Carnot Society. Security is not only a question of technological innovation, but rather also encompasses social and cultural-normative conditions which must be taken into consideration in the development and implementation of security technologies.

## **Innovation as an International Challenge**

The large and growing national economies in the Asian region are of great interest to German companies and research facilities, both as consumer markets and as competitors in the international technology markets. The high-tech potentials of these nations constitute decisive parameters for German activities in leading-edge technologies. Germany has been able to position itself well in comparison to the technological performance levels of the strongest Asian national economies – although these countries are continuing to gain ground – and has successfully entered into strategic partnerships. The growing significance of China, in particular, as a location



for research corresponds to the increased engagement of Fraunhofer ISI. In April 2008 an official cooperation agreement was made with the Institute of Policy and Management (IPM) of the Chinese Academy of Sciences CAS in Beijing, the leading institute for innovation research in China. Both partners intend to expand their expertise in innovation research and technology management together through joint projects and exchange of scientists. And they have been successful: two staff members of Fraunhofer ISI were recently given Visiting Professorships at the IPM. Furthermore, ISI was able to delegate a scientist to Beijing for an initial period of three years, while a Chinese scientist is currently working at ISI for a period of one year. Shorter research visits to ISI by Chinese colleagues have already contributed to a productive knowledge exchange in both directions. The exchange of scientists at the working level is to be further expanded.

Demand by foreign clients for Fraunhofer ISI's expertise in the international comparison of innovation systems is increasing. The Chilean government, for example, commissioned several projects in support of development and realization of a national innovation strategy. Here one of the tasks was to develop a methodology and service concept for regular, indicator-driven evaluations as well as a benchmarking system for the Chilean innovation system as the basis for planning innovation policy measures by the Chilean government. In addition to support for political planning processes, ISI formulated proposals for companies. Here a process was tested and installed in which young technology companies are assessed, selected and prepared for introduction to European venture capital investors.

*Fraunhofer ISI on a global scale: foreign clients and worldwide cooperations emphasize and strengthen the international profile.*

### **European Cooperation**

Determination of political prerequisites for economic development at the national level has long been a thing of the past. This also applies to the field of standardization of products and processes. Based on the fact that the free flow of services is underdeveloped in comparison to the flow of goods and on related positive experiences with product standards, the European Commission has ordered a feasibility study on standards for services. Fraunhofer ISI joined with European partners to analyze the current situation and to formulate proposals for future standardization measures.

The growing significance of the European contribution to innovation policies is also evident in the fact that the EU has designated 2009 as the Year of Creativity and Innovation. The foundation of the European Institute for Innovation and Technology is another sign of the increasing efforts towards coordinated innovation policies. This also includes the establishment of European networks and testing new forms of cooperation among industry, educational and research institutions as well as regional authorities. Fraunhofer ISI is participating in the establishment of an innovation community formed around the topic of "Complexity from Nano to Large Electronic Systems". The objective here is the development of a cooperative model promoting exchange among the participating agents and enabling sector-independent application and exploitation of research results.



The growing complexity of technologies can be seen in increased cooperation among the agents of the innovation system. Early identification of promising technologies and research fields is of decisive importance with regards to global competition in particular. One example here is Synthetic Biology, for which Fraunhofer ISI carried out a strategic analysis on behalf of the EU. The project contributed to the development of a shared understanding amongst the participating agents in this field (science, politics, subsidizing bodies, industry) which was maintained by all involved. A roadmap was defined representing a route towards continued strategic development of the topic in Europe. During the course of the project, national subsidizing bodies provided backing for Synthetic Biology and undertook further support measures. In this project Fraunhofer ISI was able to establish itself Europe-wide as an important contact point and sought-after expert on the topic.

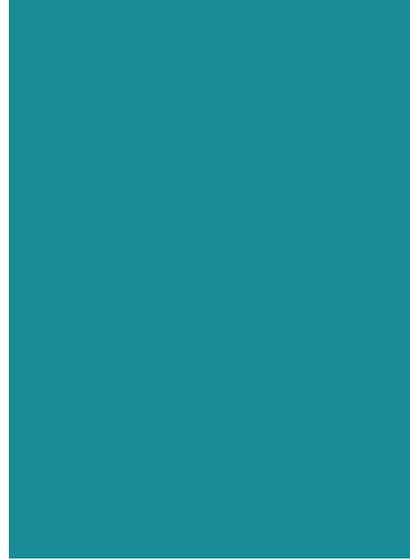
*Climate protection, products, services and security issues do not halt at national and European borders: all involved actors must coordinate innovation policy better.*

### **At Leading Edge of Real Economy**

In the mid-1980s, Fraunhofer ISI had already begun to conduct a comprehensive assessment of the manufacturing industries in Germany in the form of the regularly conducted study "German Manufacturing Survey". Today, however, information on megatrends, national trends and market developments referring to only a single country are no longer sufficient for making viable decisions and initiating future-oriented developments. Therefore the German survey was internationalized and expanded to become the "European Manufacturing Survey" (EMS), ultimately organized in twelve European countries. In 2009 the survey will include China for the first time. Cooperation with a large number of partners now makes it possible to collect information on the use of innovative organizational and technological concepts in the manufacturing of products and services as well as on key performance indicators such as productivity, flexibility and quality from over 3000 companies in the manufacturing industries in these countries. The data also form the basis for a performance benchmark which offers companies the opportunity to compare themselves with other competitors.

### **Acquiring New Markets**

Fraunhofer ISI will continue to take active advantage of the potentials of worldwide cooperation and will continue to expand collaborative activities. It is emphasizing its internationalization in selected growth markets, notably in the so-called BRICS nations (Brazil, Russia, India, China and South Africa). Initial inroads have already been made in Russia. In November 2008 a first meeting took place with a delegation from the Institute for the Study of Science of the Russian Academy of Sciences and the Graduate School of Management of the St. Petersburg State University. The goal was to explore research and innovation strategies as well as to consider possible interface points.



- |                 |            |            |                |                   |            |
|-----------------|------------|------------|----------------|-------------------|------------|
| Aberdeen        | Brussels   | Krakov     | New York       | Santa Barbara     | Toulouse   |
| Aix en Provence | Budapest   | Kunming    | Ottawa         | Santander         | Turin      |
| Amsterdam       | Edinburgh  | Ljubljana  | Oxford         | Santiago de Chile | Vancouver  |
| Barcelona       | Florence   | Luxembourg | Paris          | Seville           | Vilnius    |
| Beijing         | Geneva     | Maastricht | Prague         | Sofia             | Warsaw     |
| Bern            | Gothenburg | Malta      | Rabat          | Stellenbosch      | Washington |
| Bilbao          | Graz       | Melbourne  | Reykjavik      | Stockholm         | Wuhan      |
| Bled            | Grenoble   | Mexico     | Rio de Janeiro | Strasbourg        | Zurich     |
| Bordeaux        | Istanbul   | Milan      | San Francisco  | Tokyo             |            |

## INTERNATIONALITY

*In 2008 the ISI staff took 572  
work-related trips abroad.*



FOCUS THEME 2



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# PERSPECTIVES FOR GERMANY AS AN INNOVATION AND PRODUCTION LOCATION

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The great challenges presented to companies by times of economic turbulence and uncertainty should be turned into opportunities. As a high-wage country poor in natural resources, in international competition Germany has to rely on remaining permanently innovative and developing innovative capabilities. This applies not only to research and knowledge-intensive sectors in the service and traditional manufacturing industries, but also to the less research-intensive business sectors. How are German companies deployed in worldwide competition? What measures and initiatives can help strengthen Germany permanently as a location for innovation and production? And which technologies open new potentials for business to achieve innovation and value-added creation? Fraunhofer ISI addresses these and other questions from a variety of points of view.

*Declining research expenditures, too little cooperation between science and industry, too few young companies: Germany's technological capability is challenged.*

## **Ensuring Technological Performance Capabilities**

Germany's performance capabilities can today be evaluated as positive. One central factor is a broad knowledge base, a necessity in particular for knowledge- and research-intensive sectors such as the chemical and pharmaceuticals industries, automotive engineering, and IT service provision. However, weak points can also be found along the entire value-added chain. A number of indicators point to the fact that Germany's present good position may well be short-lived. Thus, for example, in spite of additional impetus provided at the federal level, Germany's share in worldwide research expenditures, its share in research and development personnel and in the number of young technology companies has dropped. Transparency between science and business is underdeveloped and the exploitation of discoveries at universities can also be improved. Furthermore, today there are already shortages of qualified personnel in several career areas. Therefore a comprehensive strategy described by Fraunhofer ISI is necessary in order to achieve sustainable reinforcement of technological performance capabilities. Acceleration of the transfer of knowledge and technology, new impulses on the demand side, reinforcement of clusters and networks, a coordinated innovation policy as well as the optimization and need-oriented deployment of educational activities must all be closely intermeshed with one another. Particular attention should be paid to the increased integration of older people, women and qualified foreign experts and nationals with a history of migration. This will all contribute to strengthening Germany as a location for innovation.



### **Attractiveness of Germany as an Industrial Location**

Compared to the situation several years ago, new opportunities have arisen for Germany as an industrial production location. The strong trend towards relocating production abroad has clearly weakened. Analyses of the regularly conducted "German Manufacturing Survey" by Fraunhofer ISI show that repatriations are not at all exceptional. Every fourth to sixth relocation abroad is rescinded within two to four years. In 2008 several prominent examples attracted considerable attention.

New advances call into question the option of reduction of the range of manufacture through purchase of services from third parties, which had been recommended for many years. Accordingly, the industrial companies which emphasize a high degree of value-added integration and have shown restraint in outsourcing activities in the past exhibit the highest overall factor productivity. Due to the direct customer relationship, internal provision of product-associated services also entails important and valuable impulses for a company's ability to innovate.

New products and services are an essential prerequisite for growth. Novelty is fertilized by a variety of ideas and new action pressures as well by the constantly accelerating speed of innovation. One effective chance to take advantage of this situation, as Fraunhofer ISI has ascertained, is the close networking of innovation clusters. Cooperation and bundling of expertise open new application areas and market potentials for the agents. In this context the Bavarian Ministry of Economics started a Cluster Offensive in February 2006 and created 19 clusters on topic areas which are of particular significance to the Bavarian economy. The interim evaluation of this initiative by ISI shows a positive impact. Many companies report significantly closer collaboration with other companies. And small and medium-sized companies in particular profit from increased collaboration with research institutes. Factors in the success of clusters are clear and transparent structures, a balanced mix of scientific institutions and a wide variety of companies. But hidden potential improvements can be found here as well. They can be even better exploited when both the collaboration of the clusters is intensified and custom-made projects are promoted within the clusters.

*Integrative approach to strengthen innovative capacity: Fast knowledge and technology transfer, an optimization of the education system as well as strengthening clusters and networks must be addressed as a whole.*

### **Innovation in Non-research-intensive Companies**

Especially in sectors and companies which are not research-intensive, the industrial ability to innovate is often based on impetus from customer demands, practical knowledge, application experience or on cooperation with external partners. This perspective of the "systemic character of innovations" essentially points to the question of the interactive relationship between various economic and social agents with respective highly differentiated structural, organizational and cultural conditions in the process of industrial innovation.

Fraunhofer ISI assumes that the non-research-intensive companies are not only important as agents in the context of the industrial innovation chain as a whole, but are also important for innovation in



research-intensive companies in their capacity as drivers and utilizers. Cooperative and interactive relationships between research-intensive and non-research-intensive agents thus gain in importance. A Fraunhofer ISI analysis of typical patterns, problems and obstacles for such cooperation shows that non-research-intensive companies can be successful with various innovation strategies. In accordance with a holistic understanding of innovation, any of a number of types of innovation can lead equally to success. Some of these companies, for example, cooperate closely with customers and vendors in a hybrid value-added chain and jointly develop problem solutions demanded by the market.

#### **Identifying the Potentials of Future Technologies**

Potentials for Germany as a location for innovation and production ultimately also result from the promotion of innovative technologies with high cross-sectional impact, such as information and telecommunication technologies (ICT). Fraunhofer ISI worked together with partners at the regional level to identify the perspectives of future IT and media development for Baden-Württemberg. Here it turns out that Baden-Württemberg can maintain its future orientation through the implementation of ICT as a cross-sectoral technology. This will however also require cooperation between traditionally strong IT user sectors and IT vendors to conduct joint research and development activities and in doing so to acquire new markets. Future technological potentials have been investigated in a forecast process und assembled in a roadmap.

The perspectives for the innovation and production location include both the risks and the opportunities which result from current and future developments. The key here is the holistic point of view which integrates the mutual interaction between small and large agents.

With its economic and technological performance capabilities, Germany as a region for production and innovation still offers a wide variety of competitive advantages for companies. The future task will be to continue expanding its existing strengths as well as identifying new opportunities and potentials and to communicate them to all involved agents in business, politics and the community. Fraunhofer ISI will continue to pursue this challenge in 2009.

*Made in Germany: Germany is becoming more attractive as a location once again, production off-shoring is decreasing.*



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# SUSTAINABILITY PERSPECTIVES IN POLICY-MAKING AND THE ECONOMY

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Climate change and its effects on the environment is one of the major challenges of our times. Dealing with its consequences occupies society, politics and industry worldwide. The search for sustainable solutions and strategies is determined by the growing realization that our lives are characterized by the ever greater degree of interconnectedness between economic, political, technical, social and ecological systems.

*Climate change as the mega-topic: the networked economic, political, technical and ecological systems must find common solutions and strategies.*

The complexity of modern life hinders the search for simple answers to difficult questions. As a result, there is uncertainty among the relevant decision-makers: What do targets look like which meet the requirement of sustainability? Which measures make sense to achieve the selected sustainability targets? What unintended (side) effects do these measures have and why? How can different interests be integrated so that everyone benefits? Fraunhofer ISI is tackling these questions. It searches for perspectives and design options from different angles for industrial actors and policy-makers, and compares and evaluates these.

## **Sustainable Development Scenarios**

To provide reliable foundations for political decision processes, Fraunhofer ISI, together with partners, has developed scenarios which project the impacts of the federal government's climate policy measures on greenhouse gas emissions. Around half of the emission reductions which are achievable by 2020 have to come from energy sectors, primarily the electricity sector. The transport sector and optimizing the energy efficiency of residential buildings also make important contributions here. The possible measures can achieve an emissions reduction of around 20 percent. More ambitious targets and measures, as shown in an alternative scenario, could even lower greenhouse gas emissions by more than 30 percent. Renewable energy sources play an important part in this and ISI has analyzed and described their potentials in numerous projects.

The question about the economic impacts of the necessary and agreed climate policy measures is one discussed by policy-makers, for which, however, a well-founded empirical base is often lacking. Researchers from Fraunhofer ISI have addressed knowledge gaps in the macroeconomic modeling of climate policies and consider different impact mechanisms in their analyses. Overall, a moderately positive influence on employment is expected from the climate policies being discussed



in Germany. The analysis of the impacts of Germany's integrated climate and energy package – known as the Meseberg Program – reveals that the measures will have a positive economic effect at both the macro and the micro level. In their joint project, KlimInvest 2020, Fraunhofer ISI and the Potsdam Institute for Climate Impact Research PIK worked out that climate protection does indeed pay off and has positive impacts on the job market.

The innovation impacts emanating from climate policy, which are frequently neglected in conventional analyses, can reinforce these positive impacts considerably. The development of concepts to adapt energy and transport systems to altered boundary conditions (scarcity of crude oil and climate policy demands to reduce greenhouse gases) illustrate this in two ways: the HOP! project, for example, showed that rising oil prices can actually stimulate technical and economic development in a positive way and may even lead to a reduction of the greenhouse gas emissions of transport if the correct boundary conditions are set.

### **Increasing Efficiency Intelligently**

Sustainable management offers individual companies benefits as well. Studies of Fraunhofer ISI show that, in view of increasing energy and material costs, measures to increase resource efficiency promise both profits for companies and environmental benefits in equal measure. Potentials to profitably save energy and increase energy efficiency are found in many areas. However, these potentials are being realized only partially or very slowly because of various factors such as ignorance of the available solutions, or a lack of practical experience. Local energy efficiency networks (LEEN) are an example of one model which really works and which helps companies to improve their energy balances in a profitable way. Search and decision costs can be greatly reduced by a regular exchange of experiences among those responsible for energy issues. The energy-related progress made by companies participating in the network was double or triple that of the average of all industrial enterprises. Expressed in figures of Fraunhofer ISI, the profit after taxes among network members generally amounts to 10 to 20 euros per ton avoided CO<sub>2</sub> due to efficiency gains in production.

*Triple benefits: greenhouse gas emissions can be reduced, and climate policy can positively affect the employment market. In addition, resource efficiency benefits the environment and the corporate bank account.*

Apart from technical innovations, organizational innovations also have an important role to play in conserving natural resources. These are found, for example, at the level of business models. In several sectors of industry, companies are experimenting with innovative services which result in hybrid value-added concepts. Well-known examples are chemical leasing, car-sharing or energy-contracting. Rather than physical products, the functions and services performed by these products are sold to customers instead. These kinds of business models have the potential to greatly improve the efficiency of use and thus to conserve resources. Because services and functions are being paid for, there are incentives for the suppliers to consume fewer materials and resources to provide these services. Service-based business models can help to speed up the diffusion of new resource-efficient technologies and to fully exploit conservation potentials in this way. In the end, the conservation of resources may even in itself become a commodity.



### Testing Sustainable Infrastructures

Climate change and demographic trends make it necessary to develop innovative water infrastructure systems. In different research projects, Fraunhofer ISI demonstrated both technical and organizational ways to improve the sustainability of supplying urban areas with water and disposing of the resulting wastewater. Within the scope of the DEUS 21 project, a sustainable water infrastructure system using modern technologies was implemented in a residential housing estate. The small-scale system is composed of modular components and combines high efficiency of water use with high levels of user comfort and even allows nitrogen and phosphorus compounds to be recovered from the wastewater and directly used as agricultural fertilizer. In a rural residential area, the AKWA project Dahler Feld combined the use of decentralized wastewater treatment in small-scale plants using modern membrane technology, which perform much better than conventional systems, with a new business model approach for the commercial operation of the plants. While homeowners were previously also responsible for operating the plants, a professional service company, in this case, a regional wastewater utility, now builds and operates the modern micro treatment plants on the house owner's private property. This new business model not only contributes to a more professional operation of the systems, but also supports the wider diffusion of innovative membrane technology which is still relatively expensive compared to conventional small-scale sewage treatment technologies.

These projects' results stand for tailored flexible solutions which satisfy the different requirements of sustainable supply and offer the possibility to adapt to changing boundary conditions.

The challenges of sustainable development and the necessary measures for climate protection are multi-layered. Fraunhofer ISI supports industry and policy-makers by analyzing macro- and microeconomic impacts, by developing sustainable strategies for transport, water and energy systems and by designing and evaluating innovative business ideas. Against this background, alleged contradictions, such as that supposed to exist between economic prosperity and simultaneous protection of the environment, disappear.

*Innovative water infrastructure systems: Fraunhofer ISI is a pioneer of technical and organizational solutions.*

FOCUS THEME 4



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# PROSPECTIVE ASSESSMENT REQUIRES A BROAD METHODOLOGICAL APPROACH

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*Sensor for the future:  
Fraunhofer ISI recognizes, sorts  
and analyzes signals of future  
developments. The results help  
actors to reach decisions.*

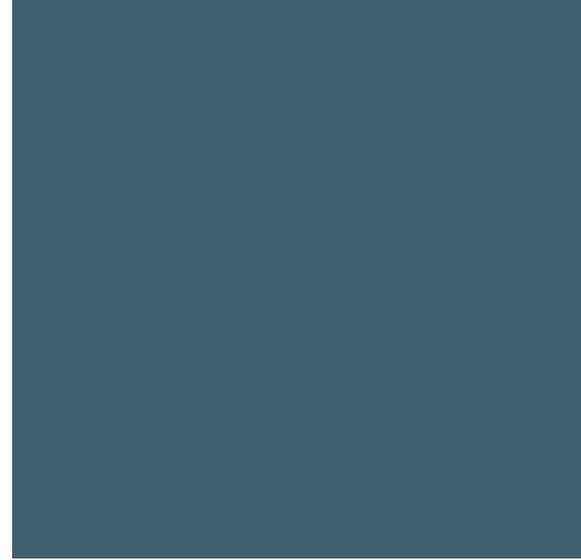
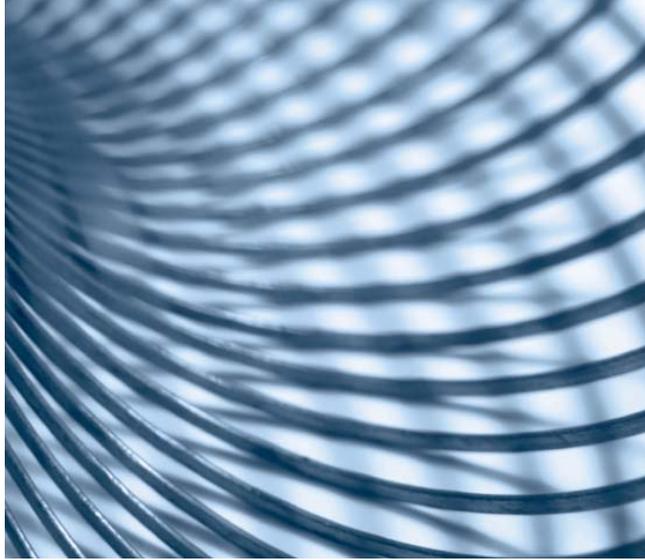
We are surrounded by many signals indicating future developments. The task of prospective assessments is to recognize, sort, and analyze these signals and their interactions. What does it mean, to analyze facts from a neutral point of view? How can developments be assessed and options for action pointed out? And finally, how can this knowledge be made available to the relevant stakeholders in an appropriate manner? Fraunhofer ISI sees its role as providing reliable information about current and future developments as the basis for political decisions transcending day-to-day business and the moderation of particular interests.

## **Basis for Political Decisions**

By applying modern foresight methods it is possible to obtain knowledge about future technological developments and thus decisive competitive advantages. In the framework of the BMBF Foresight Process, Fraunhofer ISI, together with Fraunhofer IAO, identified those topics which will play a major role in research in the mid term. Identifying promising research fields, naming overarching innovation activities and determining potentials for strategic partnerships are incorporated into action recommendations for research policy. In this way actors receive a sound basis to shape targeted research promotion programs.

A central issue for research policy was and is the evaluation of Germany's technological performance. In order to assess which fields policy-makers should become active in, the federal government in 2006 decided to establish the scientific Commission of Experts for Research and Innovation (Expertenkommission Forschung und Innovation – EFI), which since 2008 has annually presented its "Expert Report on Research, Innovation and Technological Performance" – assisted by the liaison office set up by Fraunhofer ISI and the Chair of Innovation Economics at the TU Berlin.

ISI is also involved in the evaluation of technologies and research areas. On behalf of the Office of Technology Assessment at the German Bundestag (TAB) reports and studies are regularly submitted. The analysis of the potentials of new scientific-technical developments and the investigation of their potential impacts serve to deduce alternative action and design options for political decision-makers. For instance, in the study "Work in the future" ("Arbeiten in der Zukunft") ISI formulates the requirements for an application-oriented education and training concept in bio- and nanotechnology.



### **Developing a Common Understanding for Different Policy Fields**

Among the methods applied by Fraunhofer ISI is the stimulation of initiatives and the formation of independent innovation networks. One outstanding example for this is the MetaForum "Innovation in the Healthcare System". The healthcare system needs innovations at the process, structural, product and policy levels. A real turn for the better can often not be achieved through gradual changes, fundamental changes can indeed also be necessary. But even small changes often encounter large barriers which in part reflect the conflicting interests of developers, regulatory agencies, insurance companies, politicians, hospitals, doctors and patients. The goal of the MetaForum is, together with relevant groups, to develop an understanding accepted by all participants, from which perspective innovations in the healthcare system should be assessed. Among other things, the main concern is to develop the most beneficial new treatment methods for the patient in the conflicting area between top-quality healthcare, controlled costs and taking the demands of an ageing society into account.

*Knowledge as a competitive advantage: researchers develop action recommendations for strategic partnerships from activities and potentials cutting across innovation fields.*

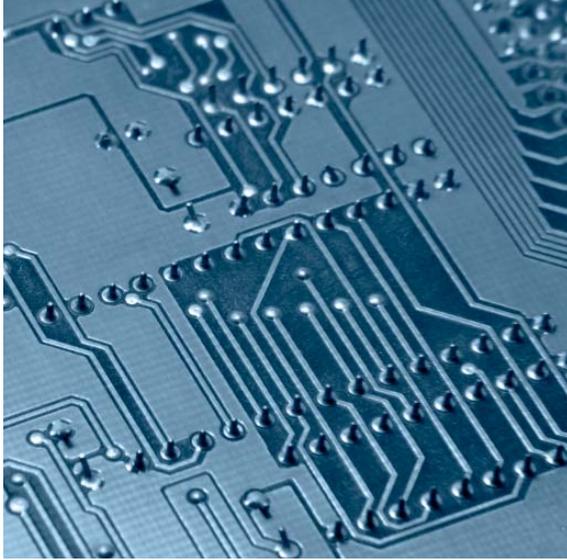
As a partner of the BMBF for the technical dialog Security Research, Fraunhofer ISI, with its cooperation partners, the Institute for Sociology at the University of Freiburg and the Max Planck Institute for Foreign and International Criminal Law, is the consultative body dealing with the social science issues in the German federal government's security research program. Thus a particularly inclusive approach to finding high-tech solutions is being pursued.

At the regional level, Fraunhofer ISI also supports policy decision-making processes with its methodological and substantive competence. The Head of the Institute, Professor Marion A. Weissenberger-Eibl, has been a member of the Innovation Council Baden-Württemberg since 2007 and chairs the working group "Baden-Württemberg 2025: Economy, Society and Industrial Change". In this working group top-level representatives from industry, science and administration elaborate strategies and recommendations on how the innovative capability of the location Baden-Württemberg can be sustainably strengthened.

In a broadly based Foresight project on strategic early identification for mechanical engineering companies and the Association VDM (Verein Deutscher Maschinenfabriken e.V.), Fraunhofer ISI develops so-called roadmaps – as a central product of technology foresight – for drive engineering. The very close cooperation with the Association VDM and its members made it possible to extrapolate early identification for a single company to include an entire branch of industry.

### **Roadmapping – Scenarios – Simulations**

The evaluation of relevant developments also necessitates deriving reliable prognoses about future developments from existing, partially weak signals. In this context, technology monitoring and the drafting of scenarios, and to an increasing extent, of simulations, play a significant role. Regardless of the special characteristics of the scenarios, the aim is to develop scenarios which are as consistent



as possible in order to deduce recommendations for action from them. Whereas scenarios represent rather qualitative developments, numerical simulations provide clues to estimate the quantitative impacts of possible scenarios. One example from Fraunhofer ISI is the modeling of efficiency and system integration of electro-mobility. Assuming various technological developments, political framework conditions and acceptance on the part of the population, two scenarios were drawn up for the market penetration of electro-mobility in the next decades, an optimistic one and a rather conservative scenario, in a project conducted for a large energy provider.

*Together for innovation:  
experts judge Germany's  
technological performance,  
assess new research fields  
and stimulate discussions.*

Fraunhofer ISI is working steadily to improve and further develop the methods used. Only through the diversity of methods, as well as the integration of different expert viewpoints and perspectives can futures research do justice to its tasks. The continuous questioning and refinement of one's own methods forms a fundamental pillar of the expert scientific and methodological expertise of Fraunhofer ISI, which is highly esteemed by politics and industry as a partner in national and international projects.

METHODOLOGICAL DIVERSITY – THE BASIS OF OUR RESEARCH

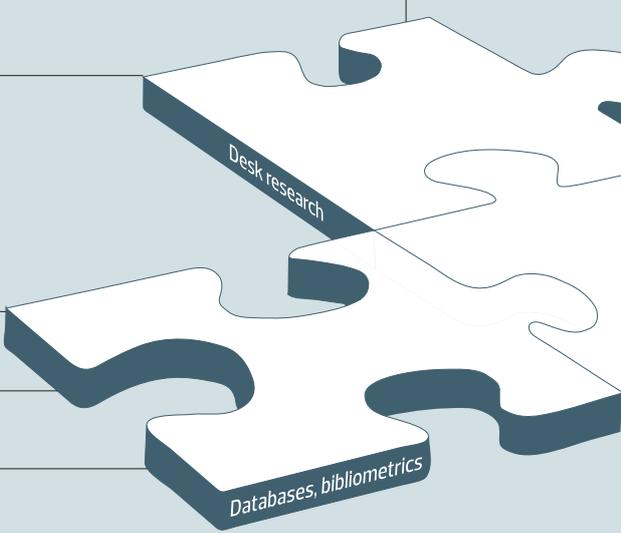
Literature searches

Internet

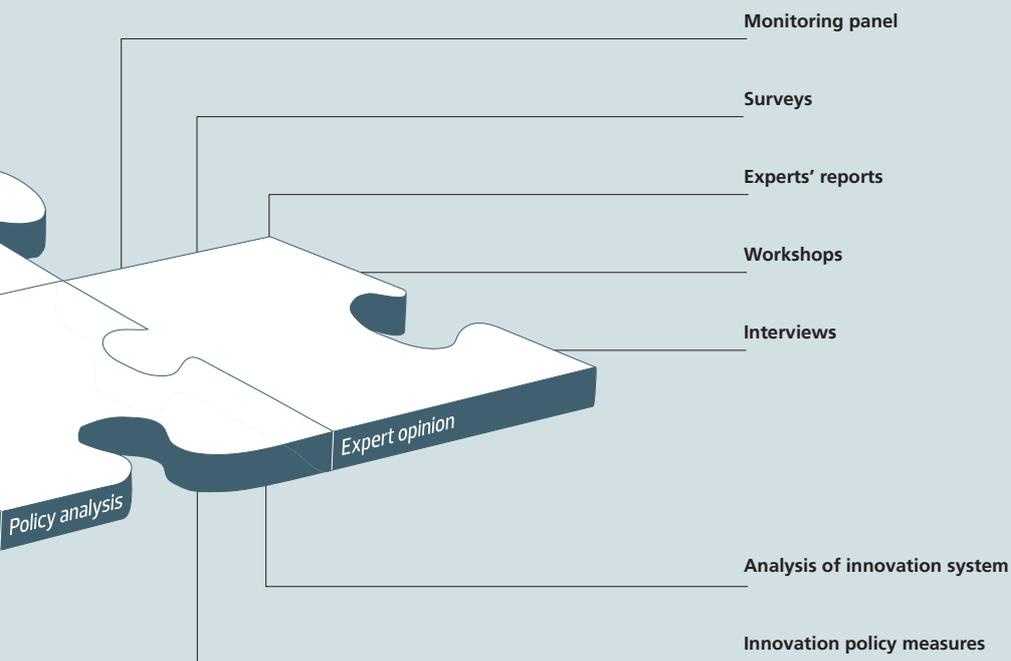
Single searches

Topic searches, clusters

Identification of experts



*Anyone who has to point out various perspectives for decision-making must have a broad repertoire of methods at his command. In Fraunhofer ISI the application of many and diverse qualitative and quantitative methods is the order of the day.*



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## THE FACES BEHIND OUR RESEARCH

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MORE THAN 160 PEOPLE FROM VERY DIFFERENT PROFESSIONAL BACKGROUNDS ARE EMPLOYED AT FRAUNHOFER ISI. GREAT IMPORTANCE IS ATTACHED TO INTERDISCIPLINARY TEAMWORK BUT AT THE SAME TIME EACH INDIVIDUAL COUNTS.

STAFF OF FRAUNHOFER ISI





ENERGY POLICY AND ENERGY SYSTEMS

Eberhard Jochem, Wolfgang Eichhammer, Edelgard Gruber, Mario Ragwitz, Anne Held, Barbara Schlomann, Brigitte Kallfaß, Gillian  
not in the photo: Tobias Fleiter, Wilhelm Mannsbart, Ursula Mielicke, Julia Oberschmidt, Volker Ott, Daniel Rosende Völker



INNOVATION AND TECHNOLOGY MANAGEMENT AND FORESIGHT

Elke Bauer, Kerstin Cuhls, Philine Warnke, Ralph Seitz, Konstantin Chernykh, Daniel Jeffrey  
not in the photo: Bruno Gransche, Michael Pielen



Claudia Hertweck-Maurer, Carsten Gandenberger, Imke Gries, Ruth Beckmann, Dominik Toussaint, Wolfgang Schade

EMERGING TECHNOLOGIES

Sven Wyd  
not in the



Friedrich Dornbusch, Joachim Hemer, Elisabeth Baier, Thomas Stahlecker, Henning Kroll, Christine Schädel, Michael Schleinkofer

REGULATION AND INNOVATION



Bowman-Köhler, Vicki Duscha, Fabio Genoese, Bärbel Katz, Heike Berleth, Marian Klobasa, David Dallinger, Marlene Arens, Renate Schmitz, Harald Bradke, Martin Wietschel, Frank Sensfuß, Barbara Breitschopf,



Koch, Ewa Dönitz, Marion A. Weissenberger-Eibl, Ralf Isenmann, Isabelle Stiazko, Benjamin Teufel, Elna Schirmeister, Antje Bierwisch

TEAM OF THE DIRECTOR Sebastian Ziegauß, not in the photo:



ra, Horst Christian Vollmar, Etienne Vignola-Gagné, Juliane Hartig, Ralf Lindner, Timo Leimbach, Bernhard Bührlen, Sibylle Gaisser, Axel Thielmann, Thomas Reiß, Bärbel Hüsing, Michael Friedewald, Renate Heger, photo: Silke Just



nut Blind SERVICE AND INTERNAL MANAGEMENT Sabine Hobich, Annelie Selinger, Roland Schönthaler, Christine Mahler-Johnstone, Martina Fuchs-Blum, Silvia Rheinemann, not in the photo: Gudrun Krenický



Joachim Schleich, Simon Hirzel, Benjamin Pfluger, Karoline Rogge



### INDUSTRIAL AND SERVICE INNOVATIONS

Robert Schneider, Eva Kirner, Christoph Zanker, Oliver Som, Anja ...  
not in the photo: Heidi Armbruster, Esther Bollhöfer, Oliver Klein



Melanie Sorhage, Marion A. Weissenberger-Eibl, Harald Hiessl, Linda Spoden, Peter Zoche  
Arlette Jappe-Heinze

### SUSTAINABILITY AND INFRASTRUCTURE SYSTEMS

Rainer Walz, Thomas Hillenbrand, ...  
not in the photo: Arne Lüllmann



Bernd Beckert, Peter Georgieff, Ines Schulze, Clemens Blümel, Susanne Ruhm, Simone Kimpeler

### POLICY AND REGIONS

Brigitte Mastel, Gabriele Küchlin, Torben Schubert, ...  
not in the photo: Stephanie Daimer, Rainer Frietsch



Petra Schmid, Ulrike Schröder, Ulrike Glutsch, Sabine Wurst, Jeanette Braun, Sabrina Bulk, Ralph Helbig, Heinz Schirmer, Uwe Pretzsch, Zoia Tasch, Klaus Wenzel, Rebecca Rangnow, Nikolaos Lymberopoulos, Gerrit ...



Nettie Walther, Tanja Künast, Ute Weißfloch, Christian Lerch, Daniela Buschak, Sabine Biege, [Steffen Kinkel](#), Spomenka Maloca, Angela Jäger, Hans-Dieter Schat, Marcus Schröter, Gunter Lay, Monika Mühlberg, Cleide Victor Kolewe



Jutta Niederste-Hollenberg, Christian Sartorius, Anja Peters, Jonathan Köhler, Eve Menger-Krug, Nicki Helfrich, Frank Marscheider-Weidemann, Stefan Klug, Claus Doll, Monika Silbereis, Katrin Ostertag, Margaretha Möst, Luis Tercero Espinoza, Jana von Horn



Emmanuel Muller, [Knut Koschatzky](#), Andrea Zenker, Taehyun Jung, Peter Neuhäusler, Ulrich Schmoch, Miriam Hufnagl, Tasso Brandt, Marianne Kulicke, Susanne Bühner, Oliver Rothengatter, Nicolai Mallig, Nicole Schulze, Thomas Stehnen, Meike Urresta Carrillo



Christoph Eich, Maria Linden, Jutta Schönthaler, Vera Wendler, Michael Ritt, Valeria Schäffer, Yvonne Barié, Sonja Mohr, Dominic Schimmel, Maria Kotalla, Sylvia Bader, Günter Heger, Viola Schielenski, Silvia Firnkes

## COMPETENCE CENTERS

EACH OF THE SEVEN COMPETENCE CENTERS AT FRAUNHOFER ISI HAS ITS OWN RANGE OF TOPICS. INDIVIDUALLY AND IN COOPERATION THEY GUARANTEE A MANY-FACETED APPROACH TO RESEARCH. TOGETHER THEY IDENTIFY PERSPECTIVES FOR POLICY-MAKERS, INDUSTRY AND SOCIETY.



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# NEW TECHNOLOGIES FOR A SUSTAINABLE ENERGY SYSTEM

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## CC ENERGY POLICY AND ENERGY SYSTEMS

*Scientists demonstrate how and at what cost Germany can reduce its greenhouse gas emissions by 40 percent.*

The efficient use of energy and the intensive utilization of renewable energy sources are key strategies for meeting energy demand in a resource-conserving and environmentally-friendly way. At the same time, export-oriented manufacturers of the relevant technologies are able to tap new markets. The Competence Center Energy Policy and Energy Systems (CC E) is accompanying the transition to a sustainable energy system in four Business Units together with cooperation partners and clients from industry and politics. The CC E draws up and evaluates instruments for the accelerated development and diffusion of sustainable and innovative energy technologies. Its analytical research gives decision-makers a better understanding of how to effectively design practical policy instruments.

In 2008, one main field of research in the Business Unit Energy and Climate Policy were the innovation impacts triggered by energy and climate policy instruments which can enhance the competitiveness of European industry. Researchers in this Business Unit analyzed how to further develop the emissions trading system of the European Union by increasing the auctioning of emission certificates or by CO<sub>2</sub>-benchmarking of industrial processes without this resulting in a relocation of production and greenhouse gases. Within the framework of the National Climate Initiative, the scientists analyzed how the revenue from auctioning can be used to improve energy efficiency in industry. With regard to the emission reductions required in the long term, the Business Unit shows how and at what cost Germany can reduce its greenhouse gas emissions by 40 percent and what contribution international climate strategies as well as adaptation measures can make to climate change after the first commitment period of the Kyoto Protocol ends in 2012.

Politics is setting more quantitative targets to increase energy efficiency. Examples are the 20 percent target and the Energy Efficiency Directive of the EU. The Business Unit Energy Efficiency initiated and accompanied the development of these goals and developed methods for the EU Commission and also for national ministries in Germany and other European countries. This can be used to evaluate both the level of target achievement and the policy instruments employed to do so. Main fields of work in 2008 included identifying, modeling and forecasting energy efficiency potentials in industrial processes and in cross-cutting technologies (for example electric motors), developing indicators to quantify efficiency improvements, evaluating measures to promote energy

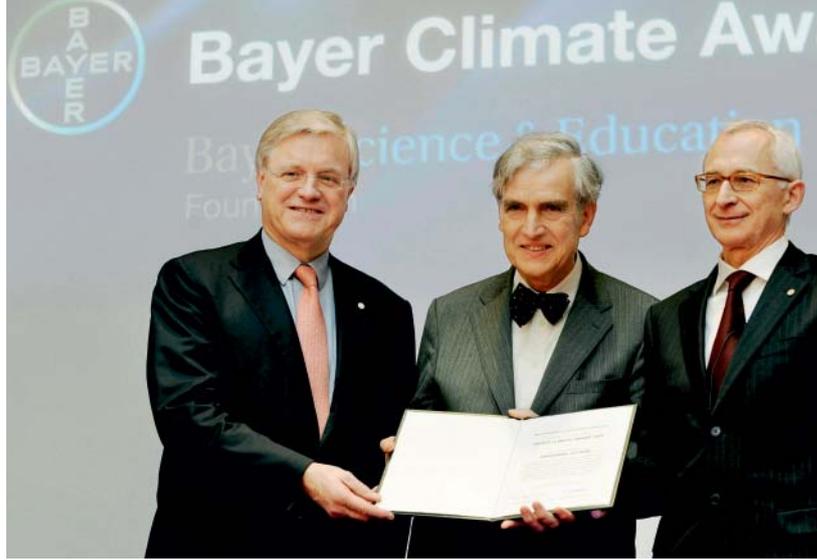


efficiency and analyzing the obstacles and factors of success affecting the diffusion of energy-efficient technologies. Energy services will open up large markets at home and abroad in the next few decades and offer the Business Unit Energy Efficiency interesting opportunities for cooperation with project sponsors from politics and industry.

The field of renewable energies was characterized last year by increasing investments and the continued dynamics of policies at national, European and international levels. The Business Unit Renewable Energies supported new energy policy instruments through broadly perceived analyses which were reflected in the climate package of the EU, in the further development of the German Renewable Energy Sources Act and in the development of instruments for renewable heat. Renewable energies open up opportunities for companies in Europe, but also for those developing and newly industrializing countries which are increasingly becoming autonomous producers of sustainable energy technologies.

The political goals of a secure, economic and environmentally-compatible energy supply and changes in the boundary conditions due to the shortage of resources, environment and climate policies as well as market regulation are increasingly raising questions about pioneering innovations in energy supply and the design of sustainable energy supply systems. Once again in 2008, the Business Unit Energy Economy conducted market analyses and forecasts for innovative energy technologies, new energy sources and services. Electric mobility and storage technologies for electricity were at the forefront of the work conducted. Clients from the electricity sector are increasingly interested in detailed analyses of the factors responsible for market expansion or shrinkage.

*Clients from the electricity industry receive analyses of the factors which influence their markets positively or negatively.*



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## CLIMATE RESEARCH AWARD FOR PROFESSOR EBERHARD JOCHEM

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Eberhard Jochem, Senior Executive at Fraunhofer ISI, is the first person to receive the newly introduced Bayer Climate Award. The Bayer Science and Education Foundation wanted to honor his groundbreaking work on energy efficiency and climate protection. "More than almost any other researcher, Professor Jochem has worked out and proven that increasing energy efficiency is the central lever to lowering greenhouse gas emissions in the various areas of our industrial society", said Werner Wenning, Chairman of the Board of Management at Bayer AG at the award ceremony in Berlin. In front of 150 guests from industry, academia and politics, the Secretary General of the European Research Council and Chairman of the Board of Trustees of the Bayer Foundation Professor Ernst-Ludwig Winnacker emphasized: "The scientific analysis of Professor Jochem has decisively influenced the development and assessment of climate policies at national and international levels."

Eberhard Jochem, who has been active at Fraunhofer ISI for more than 35 years, regards the prize as "an additional spur to continue researching how greenhouse gas emissions can be effectively reduced in an economically reasonable way when using energy". The prize money will be used for a foundation currently being established by Eberhard Jochem, who is one of the staunchest supporters of greenhouse gas limitations.

*Increasing energy efficiency  
is the central lever to  
lowering greenhouse  
gas emissions.*



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## SECURING GERMANY'S POSITION AS A PRODUCTION LOCATION

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### CC INDUSTRIAL AND SERVICE INNOVATIONS

The manufacturing industries continue to be of central importance for creating value added and for employment in Germany as an industrial location. On behalf of companies, industry associations and government policy-makers, the Competence Center Industrial and Service Innovations (CCI) analyzes and evaluates which technical and organizational innovations in the service generation process at industrial companies offer sustainable potentials in order to ensure future value-added creation at high-wage locations such as Germany. The three Business Units of the CCI consolidate important future-oriented options for industrial companies. Research activities are based on a holistic understanding of innovation, encompassing both technical and non-technical innovations, organizational and service innovations and business models based on service provision. The focus of the regularly conducted "European Manufacturing Survey" (EMS) is correspondingly broad. This comprehensive analysis looks at production structures and the implementation of innovative organizational and technological concepts. The EMS has grown to include more than 3 000 companies in the manufacturing industries in Europe and will continue to expand in a joint network of European partners, in future including Chinese partners as well.

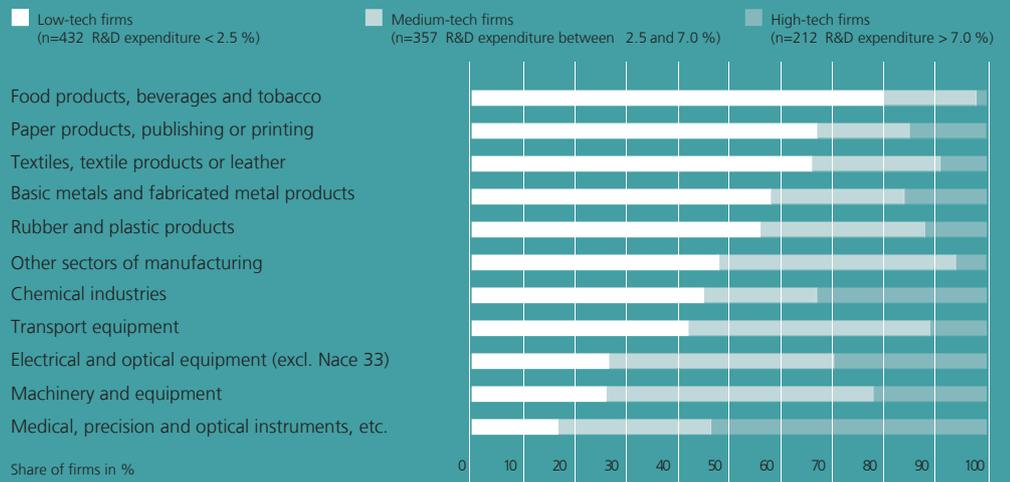
The Business Unit Technical and Organizational Process Innovations analyses new corporate and work-organizational concepts as well as modern manufacturing techniques. For example, the CCI investigates collaboration between non-research-intensive companies and research-intensive partners and develops concepts and instruments for improved management of such collaborations. The central work area of "Industrial Product Piracy" is risk-oriented threat assessment and the situation-specific design of robust piracy-resistant production systems for companies.

The Business Unit Industrial Services focuses on the potential for success of innovative product/service range combinations. A study was conducted for the German federal government's Commission of Experts for Research and Innovation (Expertenkommission Forschung und Innovation – EFI) on the

*The "European Manufacturing Survey" examines the modernization of production structures in more than 3 000 European firms.*



There are many cutting-edge technology companies, even in medium-tech sectors



“Impact of Organization and External Service Orientation on Innovations” in the manufacturing industry and at knowledge-intensive service companies. The study proved that the customer contact created and intensified through service provision represents an important information channel and driver for further product and service innovations. Further research addresses the question to what extent service-based business models contribute to increasing energy and resource efficiency in the manufacturing industries, in order to counter rising energy and resource prices in the future.

The analysis of shifting production and research and development (R&D) abroad (as well as subsequent repatriation) is the main concern of the Business Unit Futurable Production Systems and Location Management. It was possible to show that relocation of production abroad is not a one-way street. The trend towards production shifts abroad has weakened, while every fourth to sixth relocation results in repatriation. R&D activities were only shifted abroad by 3.5 percent of companies performing research. Based on extensive experience, the CCI offers interested companies concrete support for decision-making regarding corporate locations: a software product developed by the CCI enables sound and scenario-based comparisons and ensures highly reliable results.

*What is required is an integrative technology promotional policy based on the strengths of traditional technology fields, and not only designed for cutting-edge technology.*

The study “Value Added and Innovation Potentials for Medium-sized German Companies – Structures, Drivers and Success Factors” conducted on behalf of the Federation of German Industries (Bundesverband der Deutschen Industrie or BDI) and the industrial research foundation Stiftung Industrieforschung integrates issues from all three Business Units and is therefore of particular note. Motivated government policy recommendations were formulated in cooperation with the ifo institute for economic research based on comprehensive macro- and microeconomic analyses. The result was presented to high-ranking representatives from both the business and government sectors as a part of the BDI initiative “Innovation Strategies and Knowledge Management”. The core messages here are the great importance of medium-sized industrial companies from the medium- and low-tech segments in ensuring the domestic value added process and bolstering employment, the positive effect of a wide range of manufacture for operational productivity and the ability to innovate, and the need for a holistic technology promotion policy which concentrates on more than just leading-edge technologies and works in particular with existing strengths in traditional technology sectors.



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## FORESIGHT FOR STRATEGIC COURSE-SETTING

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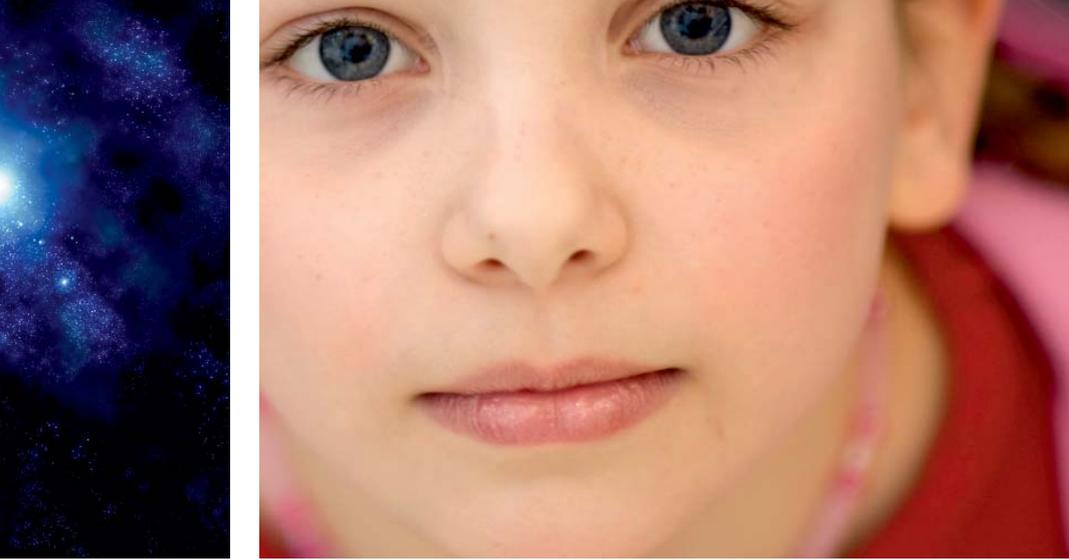
### CC INNOVATION AND TECHNOLOGY MANAGEMENT AND FORESIGHT

The Competence Center Innovation and Technology Management and Foresight (CCV) researches methods to identify and analyze long-term developments in society, industry and technology and applies them jointly with companies and political stakeholders. To this end, the Competence Center detects innovation processes, develops specific strategies and actively monitors their design and implementation. The CCV comprises the following Business Units with a wide range of services:

- Business Unit Futures Research and Foresight: conceptualization, combination and implementation of specific Foresight methods, Corporate Foresight
- Business Unit Management of Innovations and Technologies: innovation processes, organization and evaluation, roadmapping, knowledge management
- Business Unit Strategies for Material Technologies: conception of material strategies, potential analyses for new materials

The BMBF Foresight Process was of particular significance for the CCV in 2008. In this project on behalf of the German Federal Ministry for Education and Research (BMBF), the Fraunhofer Institute for Systems and Innovation Research, together with the Fraunhofer Institute for Industrial Engineering and other partners, examine issues in research and technology for the next 10 to 15 years and beyond, in order to identify new foci. Searches are not only carried out in already envisaged and new cross-cutting research fields. Areas for activities overarching research and innovation fields should be designated, potentials for strategic partnerships in different technology and innovation fields should be defined, as well as top priority action areas derived for research and development in Germany. A wide spectrum of methods is applied. Following comprehensive national and international searches, in fall 2008 an online survey with lively participation was conducted to evaluate the selected topics. The future issues which were considered to be of special importance were reported to the BMBF. Several of the topics will be further elaborated in

*Fraunhofer experts  
identify future topics for  
research and technology.*

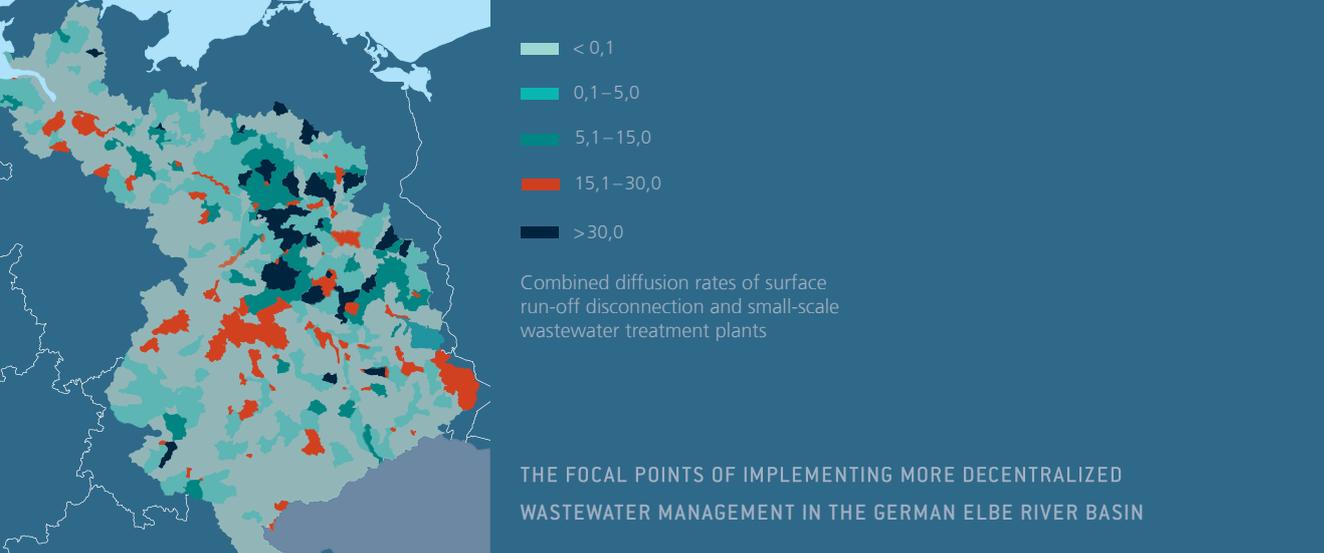


individual discussions and workshops with the BMBF. At an international conference in October 2008 in Hamburg ("Bridging the Gap") the discussions centred on how futures themes can be absorbed by innovation systems and what type of promotion seems meaningful.

In the area of security research, the CCV made a contribution to the Franco-German project SimSecur. Main theme of the project is "Civil Security". Together with seven institutes from Fraunhofer security research (EMI, IAF, ICT, IITB, IPM, ISI, IPK) as well as French Carnot institutes and research organizations (in particular CEA LIST, MINES, TIE; also C3S and GET) essential synergies resulted, due to complementary competences. The overall objective of the SimSecur project is to develop and test a simulation platform for a virtual security portal to be deployed in critical infrastructures. Fraunhofer ISI's contribution lies in checking the social science assumptions which are the basis for the development of the sensor technologies for various application contexts. The establishment of a close collaboration with the French Carnot institutes helps to dovetail the development of sensor technologies, not only interdisciplinarily, but also transnationally and to place this development on a solid Franco-German foundation.

An example of the cooperation with industry is the support provided to a large German automotive supplier in the introduction and establishment of knowledge management concepts in-house. Concepts for the absorption and exchange of knowledge should be optimally embedded in the company. The management of knowledge is considered an essential part of the work process, whose significance will increase in the future.

*Scientists work in international cooperations and bring their findings to bear in enterprise-related projects.*



## ANALYSES AND IMPULSES FOR A SUSTAINABLE DEVELOPMENT

### CC SUSTAINABILITY AND INFRASTRUCTURE SYSTEMS

Sustainable development requires entire systems to be reorganized and redesigned in the direction of environmental compatibility while simultaneously considering economic and social aspects. This transition will open up new economic opportunities. It requires changed political boundary conditions. Individual path dependencies have to be overcome. Approaching this from a systemic viewpoint means that the conditions of this transition have to be analyzed. The Competence Center Sustainability and Infrastructure Systems (CCN) is tackling this task and making a substantial contribution in this way to developing perspectives for decisions in favor of sustainable development.

*The transport sector has great potentials to save greenhouse gases.*

The main focus of research in the Business Unit Transportation Systems in 2008 was on examining the interaction between transport and climate change. It has become clear that the transport sector has large greenhouse gas saving potentials. ISI's findings formed one component which was integrated into the German Climate Strategy. Furthermore, this strategy was subjected to a macroeconomic analysis. Looking at the influence of high oil prices on transport and the national economies was another key project. The range of projects was completed by contributions to the EU handbook on the estimation of external costs of transport and to technology forecasting in the transport sector.

In the Business Unit Sustainability Innovations and Policy analyses were conducted of the competitiveness of sustainability technologies, including patent and foreign trade indicators – both regionally as well as in the context of globalization and the economic catching-up processes taking place in rapidly growing economies. Alongside these analyses, the sustainable use of raw materials in emerging technologies was also a topic which became much more important. A special kind of resource, namely land, was at the centre of the project "Spiel.Raum". Here, tests and laboratory experiments showed that trading with land use certificates permits efficiency gains.

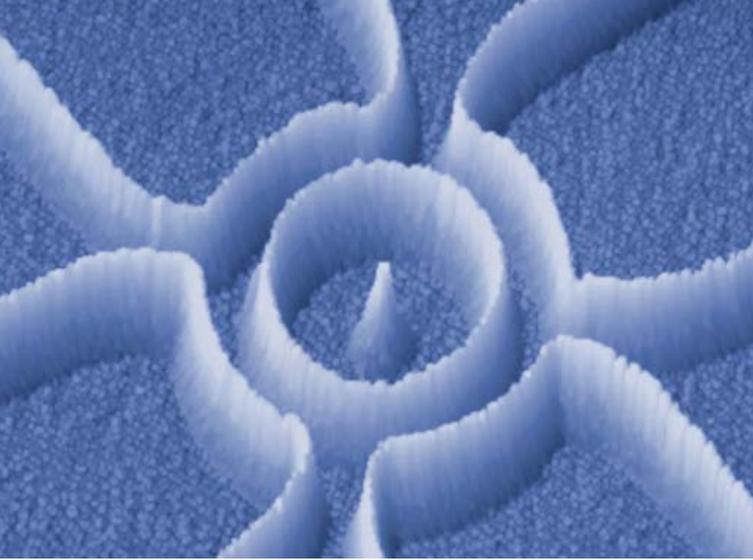


The Business Unit Systemic Risks examined the structural features of vulnerable systems. Possible structural changes are identified which could help to make them less susceptible. This field is set against the background of the various social, economic, technical and ecological systems which are becoming ever more closely interlinked and the risks connected with this development. In water supply and energy systems, first projects have been initiated which analyze the supply risks for vital resources, including approaches to reduce their vulnerability.

Studies in the Business Unit Water Management covered projects to design, evaluate and implement new urban water infrastructure systems. New technical and organizational approaches should contribute to a high degree of flexibility on the one hand and to environmental-compatibility on the other. The impacts on the water infrastructure associated with demographic changes due to a shrinking population density were also tackled. Another focus of the Business Unit was on material flow-based analyses of emission sources and implementation of the corresponding reduction measures, for example for the priority substances of the EU Water Framework Directive, and for silver, which is increasingly being used in nano-scale applications.

A detailed analysis of water-relevant technology developments and their diffusion was made within the scope of the BMBF joint project "Global Change Impacts on the Water Cycle in the Elbe River Basin" (GLOWA-Elbe). Differentiated by region, the impacts of climate change, changes induced by technology progress and the impacts of socio-economic trends on the water availability and water quality in the Elbe river basin were examined and strategies for concrete action were derived. The model-based calculation of emissions was analyzed for different scenarios and for each region separately. The growth of more decentralized concepts in wastewater management was also estimated. These results were also integrated into the project "Water 2050". In this way it is possible to identify future, sustainable systems solutions for water management as well as the necessary moves which have to be made today in order to achieve these, and to derive strategy recommendations, especially on how to strengthen the position of German industry and water management on the global water market.

*New technical and organizational approaches should contribute to a greater flexibility and environmental compatibility of urban water infrastructure systems.*



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## TECHNOLOGY IMPACT ANALYSIS FOR POLITICS, INDUSTRY AND SOCIETY

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### CC EMERGING TECHNOLOGIES

The Competence Center Emerging Technologies (CCT) investigates the emergence, diffusion, application and convergence of new technologies as well as their economic, ecological and social impacts. The scientists analyze technological and economic potentials, assess solutions and investigate basic societal and political conditions and conceptual processes. In doing so they employ a wide spectrum of methods: innovation indicators, expert surveys, polls, roadmaps and scenarios as well as technological impact assessment instruments and input-output model calculations. In 2008 the CCT worked in four Business Units and coordinated Fraunhofer ISI research in the field of nanotechnology.

In the Business Unit Biotechnology and Life Sciences, current developments of applications, services, processes and products are identified with the participation of the agents involved. Here the experts investigate factors and obstacles in the emergence, diffusion and utilization of innovations. For example, in a prognosis for the German Bundestag they investigated the question of which development lines in the life sciences could result in more individualized medical treatments, how the current state of science and technology and the possible future developments are to be regarded and which societal, economic and political implications will result from these trends. Here it was shown that the availability of a meaningful and valid biomarker is a central prerequisite for the future establishment of individualized medical care.

The Business Unit Innovations in the Health System performs innovation research on new trends and technologies in the healthcare sector by investigating development and diffusion processes for healthcare innovations, taking into account the interaction of various agent groups with often conflicting interests. One excellent example is the MetaForum "Innovation in the Healthcare System", sponsored by three private bodies and offering a new platform for joint goal-orientation on the part of all relevant interest groups. On a regular basis, internationally renowned healthcare

*The future report shows which development lines in the life sciences can contribute towards individualized medicine.*

PROF. KURT BIEDENKOPF AND  
DR. BERNHARD BÜHRLLEN (FRAUNHOFER ISI)  
AT THE METAFORUM "INNOVATION IN THE  
HEALTHCARE SYSTEM" 2008.



researchers, politicians, decision-makers and practitioners are gained as participants, speakers and as leaders of working groups. The events are accompanied by the Internet information platform [www.metaforum-innovation.de](http://www.metaforum-innovation.de) which presents to a broad public audience the intermediate results together with expert contributions to the debate about the future of the healthcare system. Parallel events with members of the Bundestag and extensive press relations support the discussion.

*A research project paints  
a future scenario for  
data protection with  
ubiquitous computers.*

The Business Unit Information and Communications Technologies conducts research and technology monitoring, forecasts and analysis of IT-based innovation potentials. The scientists also investigate the emergence and diffusion processes of new IT, such as social networks and communication in Web 2.0. Furthermore, new basic parameters for IT innovations are analyzed, subsidy programs are evaluated and political and corporate recommendations for action are formulated. Thus, as a part of the FAZIT project, future scenarios and a strategic roadmap were developed for the state of Baden-Württemberg as a location for IT and media activities. A European research project derived recommendations for how policy-makers, science and business can ensure data privacy in a future "Ambient Intelligence" scenario filled with ever-present computers. Additional research topics are the development of the software industry and the Internet of the future.

The Business Unit Economic Effects of Emerging Technologies is concerned with the role of new technologies as leading-edge and cross-sectional technologies and their significance for the ability of regional and national locations to innovate. The work areas include the investigation of innovation, growth and employment potentials and the factors crucial to the success of exploration, development, initial application and market penetration of new technologies. In a study for the Bundestag the scientists investigated the significance of research-intensive and knowledge-intensive sectors and the new technologies they use for the international competitive strength of Germany as a location for innovation. They furthermore developed options for action in new technology fields for agents in politics, science and business.



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## FUNCTIONALITY AND CHANGES IN RESEARCH AND INNOVATION SYSTEMS

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### CC POLICY AND REGIONS

The Competence Center Policy and Regions (CC P) investigates the modes of operation and the changes of research and innovation systems on different levels. The research work focuses on the diverse institutions, instruments and strategies in industry, academia and government which produce knowledge and technological innovations or are involved in their production. Using qualitative and quantitative economic and social science methods and indicators, it is possible to understand current processes so that societal groups can effectively exert influence in an informed and proactive manner. The CC P advises German and foreign governments and ministries, the European Commission and also funding organizations. Besides the development of scientific analyses, expertises and consulting, the past year was characterized by a lively exchange in many different national and international research networks.

Through a new orientation of the CCP we have succeeded in creating closer interfaces between the three thematic areas of the Competence Center which are represented by the Business Units Policy and Evaluation, Regions and Clusters as well as Innovation Indicators. The main research topics in the Business Unit Policy and Evaluation cover the functionality, interactions and change in research and innovation systems. The projects deal among others with international comparisons of innovation and technology policy funding measures, with program and system evaluation as well as with questions of firm dynamics, for instance, in the area of innovative start-ups. The Business Unit thus contributes towards increasing "strategic intelligence" and the optimization of governance structures and processes in shaping policy. In the Business Unit Regions and Clusters the analysis of the structure and dynamic of regional innovation systems and technology clusters takes center stage, driven by the fact that despite the globalization of research, production and services the regional integration of enterprises also influences their development and market success. The studies address the interactions of intra- and inter-regional networking of stakeholders as well as structures and causalities in clusters (cluster mapping), with structures and processes in metropolitan

*Researchers contribute towards increasing "strategic intelligence" and optimizing policy-making processes.*



regions and also the implications of regional multi-level governance on regional innovation and technology policy. In the Business Unit Innovation Indicators, we pursue the development and application of statistical indicators for the quantitative detection of innovations. By using these indicators, the scientific and technical output, the technological performance and the possible future technological developments can be measured. By means of comparing resource indicators (input) and progress indicators (output) conclusions can also be drawn about the performance of public research systems.

An outstanding part of our work in 2008 was to contribute our competence in projects dealing with China and in cooperation with Chinese partners. In particular, the cooperation with the Institute of Policy and Management (IPM), a part of the Chinese Academy of Sciences, was institutionalized and for instance a mutual exchange of scientists was agreed. Furthermore, the first concrete discussions about a regional innovation system analysis planned for the year 2009/10 on behalf of and in cooperation with the Beijing Academy of Science and Technology (BJAST) were held. Similarly significant was the work on the national innovation strategy for the Chilean government as well as the collaboration monitored by the Competence Center between the Fraunhofer-Gesellschaft and the Carnot institutes in France which had been working in the application-oriented field for a few years.

Our expertise in innovation research was included in studies of the Commission of Experts for Research and Innovation (Expertenkommission Forschung und Innovation – EFI) of the German federal government. Fraunhofer ISI serves here as the liaison office, not only fulfilling substantive but also organizational tasks, such as coordinating the focal and indicator studies of the participating scientific institutions, whose key findings are to be integrated in the report of the Commission of Experts.

In the context of policy consulting and evaluation, the CCP assisted the Bavarian State Ministry for Economic Affairs, Infrastructure, Transport and Technology in the interim evaluation of the Bavarian Cluster Offensive. In addition, on behalf of the Ministry for Economic Affairs of Baden-Württemberg, the institutes of the Innovation Alliance located in this federal state were evaluated. Both evaluations made significant contributions to the continuation of the funding measures and to the strategic orientation of the clusters and institutes.

*Fraunhofer ISI and the Chinese Institute of Policy and Management are intensifying mutual knowledge transfer and the exchange of scholars.*



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## IMPACTS OF REGULATIONS ON INNOVATION

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### CC REGULATION AND INNOVATION

The Competence Center Regulation and Innovation (CC R) which belongs to the Chair of Innovation Economics at the Technische Universität Berlin addresses a broad spectrum of basic innovation-economic issues. The interconnections between innovation and regulation are its core research field. The possible influences of regulatory framework conditions on innovations are particularly analyzed in this context. All types of regulations are included, so that besides regulation of the supply side, for example, research and development activities, increasingly demand-oriented regulations such as the specifications for public procurement are being focused on. In particular, the framework conditions for the emergence of new markets, including lead and leading markets are investigated, which as a rule require optimal coordination between supply- and demand-side regulation.

One particular research area is standardization research as a part of technical regulation organized by the actors themselves. Here not only are new standardization themes identified, but also the impacts of standards are examined. Besides traditional technology areas, also the relatively new field of the standardization of services is investigated.

Another main focus is the economic analysis of intellectual property rights, as well as other protection strategies. Thus, for example, patents and trademarks are utilized as innovation indicators to characterize innovation systems for further in-depth economic analyses. In addition, the economic implications of the intellectual property rights regimes are theoretically and empirically examined.

A particular highlight is the project "Identification of Future Standardization Fields", which has been conducted since 2006 on behalf of the German Institute for Standardization e. V. (DIN), together with the Chair of Innovation Economics at the TU Berlin, funded by the Federal German Ministry for Economics and Technology. This is a systematic approach to identifying standardization issues.

*Leading markets need optimal coordination between supply- and demand-side regulation.*



Through the early identification of future standardization fields, the CCR will assume a leading position in new investigative fields in standardization research and will also play an important role as a mediator among the various enterprises, research institutions and representatives of other societal groups interested in the new themes. Besides its great relevance for the German innovation system and thus also for innovation policy, the project also represents uncharted territory from a methodological perspective. For, on the one hand, an indicator system based primarily on publications and patent applications to identify promising future standardization fields was developed and continuously improved. On the other hand, by conducting Delphi studies among researchers, and by extension also to public procurers and other stakeholders from public institutions, specific, significant individual topics were identified, for instance, in the areas maintenance services or measurement and testing instruments.

In some areas, the results thus obtained were the starting point for future standardization strategies and activities.

*The CCR plays an important role as a broker between enterprises, research institutions and representatives of other societal groups.*

ANNEX



# ACADEMIC TEACHING

## ACADEMIC TEACHING

### Elisabeth Baier

Wirtschaftsstatistik I-III SRH  
Hochschule Heidelberg

### Bernd Beckert

Vorlesung Einführung in das  
Medienmanagement  
Universität Flensburg

### Knut Blind

Vorlesung Innovationsökonomie  
I + UE

Vorlesung Innovationsökonomie  
II + UE

Technische Universität Berlin

Vorlesung Normung – ein strategi-  
sches Instrument für Wirtschaft und  
Gesellschaft

Technische Universität Berlin

### Harald Bradke

Energiewirtschaftliche Aspekte der  
Energietechnik  
Fachbereich Elektrotechnik  
Universität Kassel

### Rainer Frietsch

IPM-Fraunhofer ISI joint winter  
school, IPM, Chinese Academy of  
Sciences, Peking

### Sibylle Gaisser

Vorlesung Bioverfahrenstechnik  
Hochschule Heilbronn

### Hariolf Grupp †

Seminar Dynamischer Wandel  
Wirtschaftswissenschaftliche Fakultät  
der Universität Karlsruhe (TH)

Seminar Innovationspolitik  
Wirtschaftswissenschaftliche Fakultät  
der Universität Karlsruhe (TH)

Vorlesung mit STATA-Übungen im  
CIP-Rechner-Pool „Anwendungen  
der Industrieökonomik“  
Wirtschaftswissenschaftliche Fakultät  
der Universität Karlsruhe (TH)

Doktoranden- und Diplomanden-  
seminar  
Wirtschaftswissenschaftliche Fakultät  
der Universität Karlsruhe (TH)

Vorlesung Innovationsökonomik  
Wirtschaftswissenschaftliche Fakultät  
der Universität Karlsruhe (TH)

### Harald Hiessl

Urbane Wasserinfrastruktursysteme:  
Nachhaltigkeitsdefizite und  
Handlungsoptionen (im Rahmen  
der Lehrveranstaltung „Topic of the  
Year“ von Prof. Dr. Thomas Dyllick)  
Universität St. Gallen

Wasser, Rohstoff und Energie in  
Siedlungen, Zukunftsperspektiven  
und praktische Beispiele  
Hochschule Karlsruhe

### Ralf Isenmann

Projektmodul Technologie- und  
Innovationskommunikation mit  
Roadmaps  
Universität Bremen

### Eberhard Jochem

Energiewirtschaftliches Kolloquium  
ETH Zürich

Economics of Technology Diffusion  
– Applied to New Energy Techno-  
logies  
ETH Zürich

Energy Economics and Policy  
ETH Zürich

Energiewirtschaftliches Doktorie-  
renden-Seminar  
ETH Zürich

Material Efficiency  
ETH Zürich

### Simone Kimpeler

Seminar Open Innovation  
Universität Potsdam

### Steffen Kinkel

Vorlesung und Seminar  
Offshoring & Innovation  
Universität Hohenheim

### Knut Koschatzky

Globalisierungsprozesse aus  
wirtschaftsgeographischer Sicht:  
Problemlagen und Handlungsfelder  
Universität Hannover

Theoretische Ansätze in der  
innovationsorientierten Wirtschafts-  
geographie und deren politische  
Implikationen  
Universität Hannover

Innovative Regionalentwicklung  
in Europa zwischen Kohäsion und  
Wettbewerbsfähigkeit  
Universität Hannover

### Henning Kroll

Oberseminar Wissensbasierte  
Regionalentwicklung  
Universität Gießen

### Christian Lerch

Übung Innovationsökonomik  
Universität Karlsruhe (TH)

### Ralf Lindner

Seminar Policy-Analyse – Eine  
Einführung am Beispiel der  
Forschungs-, Technologie- und  
Innovationspolitik  
Ruprecht-Karls-Universität Heidelberg

### Emmanuel Muller

Innovation systems and innovation  
policies in Europe  
Université de Strasbourg

Innovationsmanagement  
FH Heidelberg

Entscheidungsmethodik und Instru-  
mente EMI9  
FH Heidelberg

Europe in the Globalisation  
Université de Strasbourg

L'Europe dans la mondialisation:  
quelques pistes de réflexion  
University of Ottawa

### Katrin Ostertag

Socio-economic aspects of develop-  
ment planning  
Fakultät für Bauingenieur-, Geo-  
und Umweltwissenschaften  
Universität Karlsruhe (TH)

### Thomas Reiß

Vorlesung Management neuer  
Technologien  
Universität Karlsruhe (TH)

### Joachim Schleich

Associate Adjunct Professor  
Virginia Polytechnical  
Institute & State  
Blacksburg University

Internationale Klimapolitik und  
CO<sub>2</sub>-Emissionshandel  
Universität Koblenz/Landau, Fern-  
studiengang Energiemanagement

Plenspiel Emissionshandel  
Universität Koblenz/Landau, Fern-  
studiengang Energiemanagement

### Ulrich Schmoch

Seminar Techniksoziologie  
Universität Karlsruhe (TH)

Vorlesung Hochschul- und Indus-  
trieforschung in Deutschland  
Deutsche Hochschule für Verwal-  
tungswissenschaften Speyer

### Marcus Schröter

Produktionswirtschaft  
Universität Kassel

### Torben Schubert

Statistik II  
FH Heidelberg

Statistik III  
FH Heidelberg

Wahrscheinlichkeitsrechnung und  
induktive Statistik  
FH Hamm

Anwendungen der Industrieökono-  
mik (Vorlesung)  
Anwendungen der Industrieökono-  
mik (Übung)  
Universität Karlsruhe (TH)

### Oliver Som

Innovation and Technology  
Management in Companies  
University of Girona  
(Visiting Teacher)

### Horst Christian Vollmar

Seminarreihe Zukunft der Medizin  
Universität Witten/Herdecke

### Rainer Walz

Umweltökonomik und Nachhaltig-  
keit, Umwelt- und Ressourcenpolitik  
Wirtschaftswissenschaftliche Fakultät  
der Universität Karlsruhe (TH)

Short course Innovation and  
sustainability for PhD students  
Université de Strasbourg, BETA

### Marion A. Weissenberger-Eibl

Vorlesung Unternehmensnetzwerke  
im Spannungsfeld von Hierarchien  
Universität Kassel

Seminar Unternehmensnetzwerke  
und Innovation  
Universität Kassel

### Martin Wietschel

Stoff- und Energiepolitik  
Universität Karlsruhe (TH)

Seminarveranstaltungen im  
Sommer- und Wintersemester,  
Themenfelder Energie und Umwelt  
Universität Karlsruhe (TH)

Technologischer Wandel in der  
Energiewirtschaft  
Universität Karlsruhe (TH)

Quantitative Modelle zum Abbilden  
des technologischen Wandels am  
Beispiel der Energieanwendung  
ETH Zürich

### Peter Zoche

Beitrag zur Ringvorlesung Kultur  
und Technik  
Brandenburgische Technische  
Universität Cottbus

## DISSERTATIONS

### Tasso Brandt

Evaluation in Deutschland. Professionalisierungsstand und -perspektiven

### Dirk Köwener

Energiedienstleistungen und deren Übertragung auf die Wasserwirtschaft

### Torben Schubert

New Public Management und Leistungsmessung im deutschen Forschungssektor: Theorie, Umsetzung und Wirkungsanalyse

### Philipp Seydel

Entwicklung und Bewertung einer langfristigen regionalen Strategie zum Aufbau einer Wasserstoffinfrastruktur – auf Basis der Modellverknüpfung eines Geografischen Informationssystems und eines Energiesystemmodells

### Stephan Speith

Vorausschau und Planung neuer Technologiepfade in Unternehmen. Ein ganzheitlicher Ansatz für das strategische Technologiemanagement

### Sebastian Ziegau

Die Abhängigkeit der Sozialwissenschaften von ihren Medien. Grundlagen einer kommunikativen Sozialforschung

## PRESENTATIONS

### EXAMPLES

### Gerhard Angerer

Technischer Wandel und Weltwirtschaft als Treiber der globalen Rohstoffnachfrage  
5. BMBF-Forum für Nachhaltigkeit, Berlin

### Sabine Biege

Mapping Service Processes in Manufacturing Companies  
The 3rd World Conference on Production and Operations Management, Tokio, Japan

### Knut Blind

A Welfare Analysis of Standard and the ISO ODF Standard 6th ZEW Conference: The Economics of Information and Communication Technologies, ZEW, Mannheim

Business Strategy and Public Policy toward Standards in EU  
EUI, Kansai (EU Institute in Kansai, Japan) 6th International Symposium, Osaka, Japan

Rolle von Standards für den Innovationsstandort Deutschland – bewährte Konzepte, neue Erkenntnisse  
E-Government-Standards für Wirtschaft und Verwaltung. Umsetzung der EU-DLR und internationale Standards, Berlin

Innovation Policy and the Standardisation System in the EU: Trends, Challenges and Possible Solutions  
Workshop on EU Innovation Policy and the Role of Standards, Brüssel, Belgien

Can't we all just get along? IPRs, standards, interoperability, governance and cooperation  
OECD Paris: Workshop on ICT & Innovation „What is changing and what is not?“ Contribution to the Innovation Strategy on the Changing Nature of Innovation, Paris, Frankreich

### Clemens Blümel

Zwischen Innovationsdynamik und Anpassungsstrategien: Wechselwirkungen zwischen Förderorganisationen und Wissenschaft im Feld der synthetischen Biologie  
Politik und Technik, Deutsche Gesellschaft für Politikwissenschaft, Berlin

### Susanne Bühler

Zwischenevaluation der Cluster-Offensive Bayern  
Cluster- und Netzwerkevaluation – Frühjahrstreffen des AK Forschungs-, Technologie- und Innovationspolitik, Berlin

### Bernhard Bührlen

Bewertung neuer Behandlungsmethoden aus Sicht der beteiligten Akteursgruppen  
Jahrestagung Deutsches Netzwerk Evidenzbasierte Medizin (DNEbM) und Kongress der Deutschen Gesellschaft für Pflegewissenschaft (DGP), Witten

Nightcap Discussion on Understanding Innovation (Introduction)  
4th World Ageing & Generations Congress, St. Gallen, Schweiz

### Kerstin Cuhls

The BMBF Foresight Process  
FTA Seminar, Sevilla, Spanien

Foresight in Japan  
IFQ Conference, Bonn

### Claus Doll

Innovation in vehicle technology – the case of hybrid electric vehicles  
International DIME conference on Innovation, Sustainability and Policy, Bordeaux, Frankreich

### Rainer Frietsch

Scientific and technological competitiveness of the People's Republic of China  
IPM, Chinese Academy of Sciences, Peking, China

### Rainer Frietsch und Hariolf Grupp †

(mit Inna Haller und Melanie Vrohlings)

Gender-specific patterns in patenting and publishing  
12th International Schumpeter Society Conference, Rio de Janeiro, Brasilien

### Sibylle Gaisser

Setting the Agenda in Synthetic Biology  
Conference of the Royal Society of Chemistry: Chemistry in the New World of Bioengineering and Synthetic Biology, Oxford, Großbritannien

Trends and Competitiveness of European Biotechnology  
Vortrag im Rahmen des Business Forums Markttrends in der Biotechnologie auf der Analytica, München

### Stephan Gauch

Standardization, innovation and competitiveness  
Symposium on Standardization, Athen, Griechenland

### Peter Georgieff

eLearning – Auch für ältere Mitarbeiterinnen und Mitarbeiter?  
Fachtagung Neue virtuelle Welten?!  
Fortbildungsakademie des Innenministeriums des Landes Nordrhein-Westfalen, Herne

### Edelgard Gruber (mit Stefan Plesser)

EL-TERTIARY: Monitoring Electricity Consumption in the Tertiary Sector  
ICEBO '08 International Conference for Enhanced Building Operations, Berlin

### Edelgard Gruber

Zur Sache: Einsparpotenziale des energiebewussten Nutzerverhaltens. Zahlen und Fakten für den Bereich Gewerbe, Handel, Dienstleistung  
Faktor Mensch: Energieeffizienz-kampagnen zur Nutzermotivation, Tagung der Energieagentur NRW und der Technischen Akademie, Wuppertal

Monitoring Electricity Consumption in the Tertiary Sector as a Basis for Energy Efficiency Improvements  
IEECB '08 Improving Energy Efficiency in Commercial Buildings Conference, Messe Light & Building, Frankfurt

### Hariolf Grupp †

Wieviel Staat braucht die Wirtschaft? Tagung der Stiftung Marktwirtschaft und des VDMA  
„Industriepolitik – wie viel Staat braucht die Wirtschaft“, Berlin

Innovationsökonomik  
Weßling-Forum 2008, Heidelberg

Measuring Technology and Innovation  
10th International Conference on Science and Technology Indicators, Wien, Österreich

How Robust are Composite Indicators for Evaluating the Performance of National Innovation Systems  
12th International Schumpeter Society Conference, Rio de Janeiro, Brasilien

### Joachim Hemer, Elisabeth Baier

The Systems of Evaluation of the National Innovation Systems in France and Germany  
Workshop beim chilenischen Innovationsrat CNIC, Santiago, Chile

### Harald Hiessl

Managing Transition Processes  
Australian-German Workshop on Sustainable Urban Water Management 2008, Melbourne, Australien

Handlungsbedarf und Handlungsoptionen für einen nachhaltigen Umgang mit Wasser in Städten  
1. Forum des KompetenzNetzwerks Hamburg Wasser, Hamburg

Decentralized Urban Infrastructure System: DEUS 21  
Sustainable Urban Water Infrastructure: Possibilities of Adaptation and Transformation  
International workshop, Berlin

**Ralf Isenmann**

Beyond best practice in tailored CSR online reporting: Concept and implementation of a software tool with shopping cart functionality  
2nd International Sustainability Conference: Creating values for Sustainable Development, University of Basel, Schweiz

Sustainable information society  
iEMs Fourth Biennial Meeting  
International Congress on Environmental Modelling and Software, University of Catalonia, Barcelona, Spanien

**Eberhard Jochem**

How to double yearly energy efficiency gains in industry and the service sector – Cool companies  
BMW-Bund: Botschafterkonferenz der Exportinitiative Energieeffizienz, Berlin

Wertewandel zu einer 2000 Watt-Gesellschaft  
Tagung Energie-Ethik, Basel, Schweiz

Ein nachhaltiges europäisches Energiesystem – „die“ Konjunkturspritze?  
5. Konstanzer Europa-Kolloquium

Grüne Trends und Forschungsprioritäten der Wirtschaft  
Management-Konferenz, VW, Hamburg

Energie- und Materialeffizienz im Zeichen des Klimawandels  
SiemensForum, München

Hemmnisse und fördernde Faktoren für Energieeffizienzmaßnahmen im Unternehmen  
KfW Forum Strategien für Energieeffizienz in kleinen und mittleren Unternehmen, KfW Bankengruppe, Berlin

**Simone Kimpeler**

Unterwegs im Netz – Von der Datenautobahn zum Web 2.0  
Tagung [www.surfen-und-bloggen.de](http://www.surfen-und-bloggen.de), Evang. Akademie Bad Boll

Delphis, Szenarien und Roadmaps. Themen und Methoden der Kommunikationsforschung am Fraunhofer ISI  
Aktuelle Themen und Anwendungsfelder der Kommunikationsforschung, Universität Dresden

**Steffen Kinkel**

FuE-Verlagerungen deutscher Unternehmen ins Ausland  
Globalisierung von Forschung und Entwicklung – der Standort Deutschland, IWH, Halle

Eine Innovationsstrategie für Deutschland  
Innovationsstandort Deutschland. Wie gut sind Bund und Länder aufgestellt?, Bertelsmann Stiftung, Berlin

Erfolgsfaktoren für tragfähige Standortentscheidungen  
4. Freiburger Mittelstandskongress  
Zukunftsorientierte Unternehmensführung, Freiburg

Innovations- und Verlagerungsmuster im deutschen Maschinenbau und der Automobilzuliefererindustrie  
Konferenz Innovationskultur in der deutschen Wirtschaft, München

Offshoring of R&D activities and the use of organisational concepts to improve product development processes at home  
AIB 2008 Annual Meeting, Mailand, Italien

Drivers and antecedents of manufacturing offshoring and backshoring – German perspective  
15th International Annual Euroma Conference, University of Groningen, Niederlande

Drivers and antecedents of R&D offshoring in German manufacturing companies  
The R&D Management Conference, Ottawa, Kanada

Relevance of non-technical innovations  
6 CP Workshop Non-technical Innovations – Definitions, Measurement and Policy Implications, Karlsruhe

**Eva Kirner**

Innovation patterns of low-, medium- and high-tech manufacturing firms  
12th International Schumpeter Society Conference, Rio de Janeiro, Brasilien

Measuring organisational innovation – concepts, indicators and outcomes  
6 CP Workshop Non-technical Innovations – Definitions, Measurement and Policy Implications, Karlsruhe

**Marian Klobasa**

Analysis of Demand Response and Wind Integration in Germany  
European Wind Energy Conference & Exhibition (EWEC 2008), Brüssel, Belgien

**Jonathan Köhler**

Infrastructure investment for a transition to hydrogen road vehicles  
International conference on infrastructure systems 2008  
Building Networks for a Brighter Future, Rotterdam, Niederlande

**Knut Koschatzky**

Clusters and cluster policy – A critical view  
International Cluster Conference  
Innovation and international Competitiveness, Karlsruhe

The Role of Regional Leadership for New Product Development  
MINATEC Crossroads 2008, Grenoble, Frankreich

Multi-level-governance as reflected in European cohesion policy: Recent experiences in implementing RTDI policies in German regions  
DIME International Workshop Considering the Regional Knowledge Economy, Newcastle, Großbritannien

New forms of strategic research collaboration between firms and universities – Empirical evidences from the German innovation system  
3rd Sino-German Workshop on Technical Innovation and Management, Kunming, China

Regional networking and cluster formation in Germany  
Canadian-German Workshop on Innovation Strategies and Tools, München

**Henning Kroll**

Managing the interface between public sector applied research and technological development in the Chinese enterprise sector  
R&D Management Conference, Ottawa, Kanada

**Gunter Lay**

Ganzheitliche Produktionssysteme – Ein Überblick  
Forum Produktionssysteme in der Automobilindustrie und Auswirkungen auf benachbarte Branchen, Lohr am Main

Auswirkungen der Organisation und Außenorientierung von Dienstleistungen auf Innovationen  
Workshop der Expertenkommission Forschung und Innovation (EFI), Berlin

**Timo Leimbach**

Innovation und Finanzierung in wissensintensiven Branchen: Die Softwarebranche in Deutschland  
Tagung Finanzierung von Innovationen, Stuttgart

Abschätzung des Energiebedarfs der IKT und Handlungsempfehlungen für Energieeinsparung, Bitkom-Innovationsforum Green IT – Energie und Ressourcen schonen mit neuen Technologien, Systems, München

**Ralf Lindner**

E-Petitions at the German Bundestag – Main Results of the Scientific Evaluation  
EGov 2008 – 7th International Conference on Electronic Government, Turin, Italien

**Emmanuel Muller**

Les nouvelles orientations du développement régional: le cas de l'Alsace  
Colloque Territoires et action publique territoriale de l'ASRDLF (Association des Sciences Régionales de Langue Française), Rimouski, Kanada

**Katrin Ostertag**

Energy and Material Efficiency in China and Germany: Specialisation patterns and Cooperation Potentials  
International DIME conference on Innovation, Sustainability and Policy, Bordeaux, Frankreich

Governance variety in the energy service contracting market  
1st DIME Scientific Conference  
Knowledge in space and time: economic and policy implications of the knowledge-based economy, Straßburg, Frankreich

**Mario Ragwitz**

Der Klimawandel und die Konsequenzen für eine Europäische Energiepolitik after oil  
Europäische Energiekonferenz  
Europäische Energieversorgung im Zeichen des Klimawandels und der Energieverknappung, Erfurt

Assessment of the impact of renewable electricity generation on the German electricity sector  
European Wind Energy Conference 2008, Brüssel, Belgien

Renewable energy sources potentials and targets, new flexibility systems & efficient instruments  
ITRE Workshop Opportunities for renewable energy development in Europe, European Parliament, Straßburg, Frankreich

Concentrated solar power in the developing world  
Climate Change Solutions Summit with former Vice President Al Gore, New York, USA

# PRESENTATIONS | PROJECTS

## **Thomas Reiß**

Policy approaches to furthering synthetic biology  
Towards a European strategy for synthetic biology – stakeholder meeting, Brüssel, Belgien

Performance of European countries in biotechnology – Role of public funding activities

Workshop IPM, Chinese Academy of Sciences and Fraunhofer ISI, Peking, China

## **Christian Sartorius**

A niche approach to the diffusion of decentralized wastewater and stormwater management in the Elbe region

International DIME conference on Innovation, Sustainability and Policy, Bordeaux, Frankreich

Estimating the diffusion of decentralized wastewater and stormwater management on the basis of land use data

ERSEC International Conference on Sustainable Land Use and Water Management, Peking, China

## **Wolfgang Schade**

Scenarios, policies and impacts for the linked transport and energy systems

Transport Research Arena Europe, Ljubljana, Slowenien

Forum 3 Verkehr – Einstiegsvortrag  
BMU Investitionskonferenz: Investitionen, Wachstum, Klimaschutz, Berlin

## **Joachim Schleich**

Barriers to Energy Efficiency: A Comparison Across the German Commercial and Services Sector.  
International Association for Energy Economics (IAEE), 31st International Conference, Istanbul, Türkei

## **Joachim Schleich und**

**Katrin Ostertag**  
**(mit Karl Martin Ehrhart,**  
**Stefan Seifert und Jens Müller)**

Certificate Trading Schemes for New Land Use

European Round Table for Sustainable Consumption and Production (erscp 2008), Berlin

A Field Experiment with Tradable Development Rights in Germany  
Group Decision and Negotiation (GDN), Coimbra, Portugal

## **Barbara Schlomann**

Results of the survey on electricity consumption in German households

Workshop Energy Efficiency in Buildings – Improving the Database, Berlin

## **Ulrich Schmoch**

New Public Management and Indicator-based Resource Allocation: Quantitative Performance Measurement in Science Does not need to be Naive, STI-Conference, Wien, Österreich

## **Marcus Schröter**

Chancen und Risiken von Betreibermodellen

Erfolgreich mit neuen Finanzierungsformen für die Medizintechnik, Stuttgart

Potenziale für eine nachhaltige Entwicklung durch hybride Konzepte der Wertschöpfung

5. BMBF-Forum für Nachhaltigkeit  
Forschung für Nachhaltigkeit – Treiber für Innovationen, Berlin

## **Oliver Som**

Drivers of the product innovativeness of the German mechanical engineering industry  
PRODUCT DEVELOPMENT and related processes. EXPAND, Bordeaux, Frankreich

Development of a Self-assessment Tool for Measuring the Innovativeness of Small and Medium-sized Enterprises (SMEs)

European Symposium on Innovative Management Practices ERIMA, Porto, Portugal

## **Horst Christian Vollmar**

Wissensvermittlung zur Demenz in der Allgemeinmedizin: Ein cluster-randomisierter Vergleich zweier Fortbildungskonzepte  
7. Deutscher Kongress für Versorgungsforschung 2008, Deutsches Netzwerk Versorgungsforschung, Köln

## **Rainer Walz**

Approaches to evaluate absorptive capacities and impacts on the competitiveness of a country  
Seminar on Future of Energy Technologies in Russia, Berlin

Competences for Sustainability Technologies in the BRICS countries  
Joint IPM-ISI seminar, IPM, Chinese Academy of Sciences, Peking, China

Technological Competences in Sustainability Technologies in Germany

1st German-Polish Conference on Research for Sustainability, Warschau, Polen

Technological competences in sustainability technologies in the BRICS countries

Conference Confronting the Challenge of Technology for Development – Experiences from the BRICS, Oxford University, Großbritannien

Research and Technology Competence for a Sustainable Development in the German Innovation System  
South African-German Dialogue on Science for Sustainability, Bonn

How regulation influences innovation: an indicator based approach for the case of renewable energy technologies

6th GLOBELICS Conference, Mexico City, Mexiko

## **Marion A. Weissenberger-Eibl**

Innovationssysteme und Roadmapping: Prozesse und Handlungsempfehlungen

BMBF-Fachkonferenz pre agro - Precision Farming kommt!, Berlin

Die Zukunft der Automobilindustrie: Systemische Erfolgsfaktoren  
Management-Konferenz, Kassel

Innovation on the Move: Innovationsmanagement und organisationales Lernen, Rheinau Summer Academy 2008, Köln

Wissenschaft und Wirtschaft: Initialisierung einer gewinnbringenden Symbiose, 2. Wirtschaftswoche  
Konferenz Umwelttechnologie. Marktchancen für Energiewirtschaft und Industrie, Berlin

## **Christoph Zanker**

Standortentwicklung und Produktionsverlagerung. Strategien der Betriebsräte

IG BCE Betriebsrätekonferenz, Hannover

Standortbewertung – eine Frage der Kosten?

Agiplan Unternehmertag, Iserlohn

## **Peter Zoche**

e-Security, Informationstechnik – Innovationsmotor der Zukunft  
Berlin-Brandenburgische Akademie der Wissenschaften, Berlin

Innovationscluster zur Sicherheitsforschung  
do it.-Kongress, FAZIT Networkshop Sicherheit mit IT, Neue Messe Stuttgart

Sicherheitsforschung: Forschungsansätze und Wege für die Umsetzung  
7. DSTGB-Fachkonferenz Bürgernahe Sicherheitskommunikation für Städte und Gemeinden, Landesvertretung Baden-Württemberg, Berlin

Verkehrssysteme und Infrastruktur – Gut gerüstet für die Zukunft?

30. Ulmer Gespräch des Zentralverband Oberflächentechnik (ZVO), Neu-Ulm

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## ENERGY POLICY AND ENERGY SYSTEMS

### PROJECTS AND CONTACT PERSONS

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Einzel- und gesamtwirtschaftliche Analyse von Kosten und Nutzen des Ausbaus erneuerbarer Energien im Strom- und Wärmemarkt

**Barbara Breitschopf**

Kurz- und langfristige Auswirkungen des Ausbaus der Erneuerbaren Energien auf den deutschen Arbeitsmarkt

**Barbara Breitschopf**

Towards Hydrogen and Electricity Production with Carbon Capture and Storage

**Clemens Cremer**

Mitarbeit im Sekretariat der Arbeitsgruppe Emissionshandel zur Bekämpfung des Treibhauseffekts

**Vicki Duscha**

Wirtschaftliche Bewertung von Maßnahmen des Integrierten Energie- und Klimaprogramms

**Wolfgang Eichhammer**

Wissenschaftliche Beratungen für Start- und Umsetzungsphasen der Klimaschutzinitiative

**Wolfgang Eichhammer**

Quantification of the Effects of EU Policies and Measures on Greenhouse Gas Emissions

**Wolfgang Eichhammer**

Politiksznarien für den Klimaschutz <b>Wolfgang Eichhammer</b>	Wissenschaftliche Begleitung der Feed-in-Cooperation <b>Anne Held</b>	Integration von Windenergie in ein zukünftiges Energiesystem durch verbessertes Lastmanagement <b>Marian Klobasa</b>	Policy Development for Improving the Penetration of Renewable Heating and Cooling in European Member States <b>Mario Ragwitz</b>
Development of Benchmarking Criteria for CO <sub>2</sub> Emissions in the EU Emissions Trading System <b>Wolfgang Eichhammer</b>	Analysis of Policy Effectiveness and Support Level Efficiency of Renewable Energy Policies in OECD and Emerging Economies <b>Anne Held</b>	Integration of Renewables into Infrastructures <b>Marian Klobasa</b>	Analyse von Ausgestaltungsvarianten eines Wärmegesetzes für Erneuerbare Energien <b>Mario Ragwitz</b>
Berechnung und Meldung von Endenergieeinsparungen im Rahmen der EU-Energieeffizienzrichtlinie <b>Wolfgang Eichhammer</b>	Energy Security: Uncertainty, Risk and Economics <b>Anne Held</b>	Kommerzielle REDOX Flow Batterien Systeme <b>Julia Oberschmidt</b>	Unterstützung des Bundesumweltministeriums bei der Weiterentwicklung von EU-Politiken zur Förderung Erneuerbarer Energien <b>Mario Ragwitz</b>
Evaluation and Monitoring of the EU Directive on Energy End-Use Efficiency and Energy Services <b>Wolfgang Eichhammer</b>	Energieeffizienz in der Produktion im Bereich Antriebs- und Handhabungstechnik <b>Simon Hirzel</b>	Entwicklung von skalierbaren, stationären Stromspeichern zur Netzentlastung bei der Integration fluktuierender erneuerbarer Energien <b>Julia Oberschmidt</b>	Characterization of Alternative Renewable Energy Scenarios for the EU <b>Mario Ragwitz</b>
Erstellung des Nationalen Energieeffizienzplans und einer Energiestrategie für Luxemburg <b>Wolfgang Eichhammer</b>	Energy Efficient Elevators and Escalators <b>Simon Hirzel</b>	Barriers for Wind Energy Development in EU Member States <b>Benjamin Pfluger</b>	Renewable Energy Development and Policy Advice in China <b>Mario Ragwitz</b>
Unterstützung Luxemburgs bei der Umsetzung der EU-Energieeffizienzrichtlinie und der Concerted Action Energy Service Directive <b>Wolfgang Eichhammer</b>	Investitionen für ein klimafreundliches Deutschland: makroökonomische Wirkungen <b>Eberhard Jochem</b>	Benchmark für Investitionsbedingungen im Bereich der Erneuerbaren Energien in den EU-Mitgliedsstaaten <b>Benjamin Pfluger</b>	Energietechnologien für eine nachhaltige Entwicklung in Entwicklungsländern <b>Mario Ragwitz</b>
Monitoring Energy Efficiency in the EU 27 <b>Wolfgang Eichhammer</b>	Adaptation and Mitigation Strategies: Supporting European Climate Policy <b>Eberhard Jochem</b>	Organisation und Durchführung der Kampagne Druckluft Schweiz <b>Peter Radgen</b>	Corporate Climate Innovation Strategies in Response to International Market-based Climate Policies <b>Karoline Rogge</b>
Study on the Energy Savings Potentials in the EU Member States, Candidate Countries and EEA Countries <b>Wolfgang Eichhammer</b>	Umweltkommunikation und Energieeffizienz in KMU: Moderierte Energie-Effizienz-Tische in Netzwerken <b>Eberhard Jochem</b>	Umsetzung eines internetgestützten Benchmarkings von Druckluftanlagen für die Schweiz <b>Peter Radgen</b>	Wirkungen neuer klimapolitischer Instrumente auf Innovationstätigkeiten und Marktchancen badenwürttembergischer Unternehmen <b>Joachim Schleich</b>
Early Market Introduction of New Energy Technologies in Liaison with Science and Industry <b>Wolfgang Eichhammer</b>	Nachhaltiger Energiekonsum von Tarifkunden durch intelligente Zähler-, Kommunikations- und Tarifsysteme <b>Marian Klobasa</b>	Beratung der Regierung Luxemburgs zum EU-Energie- und Klimapakete von 2008 <b>Mario Ragwitz</b>	Weiterentwicklung der EU-Emissionshandelsrichtlinie <b>Joachim Schleich</b>
Monitoring Electricity Consumption in the Tertiary Sector <b>Edelgard Gruber</b>	Potenzialstudie zum Einsatz hocheffizienter Kraft-Wärme-Kopplungsanlagen in Luxemburg <b>Marian Klobasa</b>	Basic Research and Innovative Science for Energy <b>Mario Ragwitz</b>	Klimaregime nach 2012: Mögliche Beiträge von Industrie- und Schwellenländern zur Emissionsreduktion <b>Joachim Schleich</b>
Technik und Potenziale von intelligenten Zähl-, Mess- und Kommunikationssystemen zur Energieeinsparung <b>Edelgard Gruber</b>	Wärme-Potenzial und Perspektiven der Kraftwärmekopplung in Deutschland <b>Marian Klobasa</b>	Impact of Sustainable Energies on Employment and Growth in the European Union <b>Mario Ragwitz</b>	Ökonomische und Ökologische Evaluierung einer globalen Klimarchitektur nach 2012 <b>Joachim Schleich</b>
Sozialwissenschaftliche Begleitforschung zum Projekt Energieeffiziente Schule eines Energieversorgers <b>Edelgard Gruber</b>	Kurz- bis mittelfristig realisierbare Marktpotenziale für Lastmanagement im gewerblichen Sektor <b>Marian Klobasa</b>	Analysis of the Achievement of National and Community Targets for 2010 under the Renewable Energy Directive <b>Mario Ragwitz</b>	Soziale, ökologische und ökonomische Dimensionen eines nachhaltigen Energiekonsums in Wohngebäuden <b>Joachim Schleich</b>
Initiative Botschafter für Rationelle Energienutzung in KMU <b>Edelgard Gruber</b>	Energetische Optimierung von Einzelhandelsflächen <b>Marian Klobasa</b>	Deriving a Future European Policy for Renewable Electricity <b>Mario Ragwitz</b>	Erstellung des nationalen Projektionsberichts 2009 im Rahmen des EU-Treibhausgasmonitorings <b>Barbara Schlomann</b>

# PROJECTS

Entwicklung von Methoden für Deutschland zur Evaluierung von Energieeinsparung gemäß Energieeffizienzrichtlinie  
**Barbara Schlomann**

Energieeffizienz in Zahlen  
**Barbara Schlomann**

Residential Monitoring to Decrease Energy Use and Carbon Emissions in Europe  
**Barbara Schlomann**

Energieverbrauch des Sektors Gewerbe, Handel und Dienstleistungen 2004 bis 2006  
**Barbara Schlomann**

Survey of Compliance for the EU Energy Labelling Directive  
**Barbara Schlomann**

Abschätzung des Energiebedarfs der weiteren Entwicklung der Informationsgesellschaft  
**Barbara Schlomann**

Standby and Off-Mode Energy Losses in New Appliances Measured in Shops  
**Barbara Schlomann**

Kommentierung der Mittelfristprognose zum Erneuerbare Energien Gesetz des Bundesverbandes der Energie- und Wasserwirtschaft  
**Frank Sensfuß**

Regenerative Energieträger zur Sicherung der Grundlast in der Stromversorgung: Beitrag, Perspektiven und Investitionen  
**Frank Sensfuß**

Begleitung der fachlichen Ausarbeitung eines Kombikraftwerkbonus gemäß Erneuerbare Energien Gesetz  
**Frank Sensfuß**

Weiterentwicklung des Erneuerbare Energien Gesetzes für den deutschen und europäischen Strommarkt  
**Frank Sensfuß**

Wissenschaftliche Begleitung des Erfahrungsberichts zum Erneuerbare Energien Gesetz  
**Frank Sensfuß**

Kostenpotenzialkurven einer CO<sub>2</sub>-Minderung in der EU27  
**Martin Wietschel**

Possible Developments of Market Conditions Determining the Economics of Large Scale Compressed Air Energy Storage  
**Martin Wietschel**

Energiotechnologien 2050 – Schwerpunkte für Forschung und Entwicklung  
**Martin Wietschel**

Energy and CO<sub>2</sub>-Emission Forecasts for Europe  
**Martin Wietschel**

Methods and Tools for Integrated Sustainability Assessment  
**Martin Wietschel**

Benchmarking of the European Hydrogen Energy Roadmap HyWays with International Partners  
**Martin Wietschel**

Perspektiven einer künftigen Bereitstellung von Wasserstoff als Energieträger in Deutschland  
**Martin Wietschel**

Marktwirtschaftliche Analysen für Plug-in-Hybrid Fahrzeugkonzepte  
**Martin Wietschel**

Six Countries Programme – The International Innovation Network  
**Steffen Kinkel**

Strukturen industrieller Wertschöpfung, zukunftssträchtige Innovationsfelder und Wertschöpfungspotenziale mittelständischer Industrieunternehmen in Deutschland  
**Steffen Kinkel**

Die aktive Rolle der Mitbestimmungsinstitutionen im betrieblichen Innovationsprozess  
**Steffen Kinkel**

Zusammenhang zwischen Produktionsverlagerungen und der Innovationsfähigkeit von Betrieben – Quantitative Analysen und Schlussfolgerungen für die strategische Unternehmensplanung  
**Steffen Kinkel**

Analyse der quantitativen und qualitativen Dimension von Produktions- und FuE-Verlagerungen deutscher Betriebe ins Ausland – strategische Schlussfolgerungen für die Betriebsrats- und Gewerkschaftsarbeit  
**Steffen Kinkel**

Wandlungsfähige Organisation produzierender Unternehmen  
**Steffen Kinkel**

Voruntersuchung Wandlungsfähiger Produktionssysteme  
**Steffen Kinkel**

Gestaltung von piraterierobusten Produkten und Prozessen  
**Steffen Kinkel**

Analysen zur VDI-ISI-Initiative „Pro Produktionsstandort Deutschland“  
**Steffen Kinkel**

Organisatorische Innovation  
**Eva Kirner**

Measuring the Dynamics of Organisations and Work  
**Eva Kirner**

Innovationsmanagement für Lowtech-Hightech-Kooperationen, Teilvorhaben Kooperationsmuster zwischen Lowtech- und Hightech-Unternehmen: Analyse und Gestaltung  
**Eva Kirner**

Integrierte Modernisierungsprozesse für kleine und mittlere Unternehmen des Verarbeitenden Gewerbes (IMPROVE)  
**Gunter Lay**

Next Generation Machine Tools  
**Gunter Lay**

Dienstleistungsexport mit Industrieprodukten (DEXINPRO) – Entwicklung organisatorischer Modelle zur Steigerung der Exportfähigkeit industrieller Betreibermodelle  
**Gunter Lay**

Deutsche und europäische Erhebung zur „Modernisierung der Produktion“  
**Gunter Lay**

Auswirkungen der Organisation und der Außenorientierung von Dienstleistungen auf Innovationen  
**Gunter Lay**

Voruntersuchung Transfer von Forschungsergebnissen in die mittelständische Industrie (Transferinitiative)  
**Gunter Lay**

Service Chain Management in industriellen Wertschöpfungsketten  
**Robert Schneider**

Lebenszyklusoptimierte Montagesysteme für den Hochleistungsstandort Deutschland  
**Marcus Schröter**

Energieeffizienz in der Produktion im Bereich Antriebs- und Handhabungstechnik  
**Marcus Schröter**

Chancen für die Nachhaltige Entwicklung durch neue hybride Wertschöpfungskonzepte  
**Marcus Schröter**

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## INDUSTRIAL AND SERVICE INNOVATIONS

### PROJECTS AND CONTACT PERSONS

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Begleitung, Bewertung und Erarbeitung von Schlussfolgerungen des Förderschwerpunktes „Exportfähigkeit und Internationalisierung von Dienstleistungen“ (Meta-Projekt)  
**Sabine Biege**

Begleitvorhaben zum Themenfeld Werkzeugmaschine 2010 – Szenariengestützte Instrumente zur Strategieentwicklung, Transferbündelung und begleitende Wirkungsanalyse  
**Steffen Kinkel**

The European Robot Initiative for Strengthening the Competitiveness of SMEs in Manufacturing  
**Steffen Kinkel, Heidi Armbruster**

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## INNOVATION AND TECHNOLOGY MANAGEMENT AND FORESIGHT

### PROJECTS AND CONTACT PERSONS

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Onlinebefragung ExcellenzAkademie  
**Antje Bierwisch**

BMBF-Foresight-Prozess  
**Kerstin Cuhls**

Roadmap for application of robotics in medicine and healthcare  
**Kerstin Cuhls**

European Foresight Monitoring Network  
**Kerstin Cuhls**

BMBF-Synchrotron: Studie zur Kostenbetrachtung von Photonenquellen und deren Beitrag zum Innovationsprozess  
**Ralf Isenmann**

European ICT Environmental Sustainability Research  
**Ralf Isenman**

ErkenntnisTransferInitiative (eti)  
**Daniel Jeffrey Koch**

Systematisches artefakt- und verhaltensorientiertes Wissenmanagement bei der Robert Bosch GmbH  
**Daniel Jeffrey Koch**

Konzeption und Implementierung einer strategischen Frühaufklärung für die Mitglieder des Vereins Deutscher Werkzeugmaschinenfabriken e.V.  
**Elna Schirrmeister**

EFONGA European Forum on New Glass Applications 2008 Meeting for Invited Experts – Advanced Materials and Innovative Melting Technology in the Year 2020  
**Marion A. Weissenberger-Eibl**

SimSecur – Simulationsplattform für ein virtuelles Sicherheitsportal in kritischer Infrastruktur  
**Peter Zoche**

Fachdialog Sicherheitsforschung, unterstützende Stelle  
**Peter Zoche**

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## SUSTAINABILITY AND INFRASTRUCTURE SYSTEMS

### PROJECTS AND CONTACT PERSONS

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Improved Decision-aid Methods and Tools to Support Evaluation of Investments for Transport and Energy Networks in Europe  
**Claus Doll**

Design Appropriate Contractual Relationships  
**Claus Doll**

Entwicklung eines integrierten, optimierenden Bewertungs- und Allokationsmodells für ein nationales Emissionsmanagement (otello)  
**Claus Doll**

Technology Trends in Germany  
**Claus Doll**

Long-run Modal Shift and Climate Effects of Mega-Trucks  
**Claus Doll**

Dezentrales Urbanes Infrastruktursystem DEUS  
**Harald Hiessl**

Fortsetzung zum Projekt Dezentrales Urbanes Infrastruktursystem DEUS  
**Harald Hiessl**

Regional Infrastructure Foresight (RIF)  
**Harald Hiessl**

Wasser 2050: Nachhaltige wasserwirtschaftliche Systemlösungen – künftige Chancen für die deutsche Wasserwirtschaft  
**Harald Hiessl**

Demografischer Wandel als Herausforderung für die Sicherung und Entwicklung einer kosten- und ressourceneffizienten Abwasserinfrastruktur  
**Harald Hiessl**

Bundestags-Projekt Verletzbarkeit/ Begleitprojekt zum TAB-Projekt Gefährdung und Verletzbarkeit moderner Gesellschaften – am Beispiel eines großräumigen Ausfalls der Stromversorgung  
**Harald Hiessl**

Prioritäre Stoffe der Wasserrahmenrichtlinie – europäische Regelung und nationales Maßnahmenprogramm  
**Thomas Hillenbrand**

Prympark Düren – Lebensphasen Wohnen  
**Thomas Hillenbrand**

Direkt-Ethanol-Brennstoffzelle (DEFC)  
**Frank Marscheider-Weidemann**

Analyse der Stärken Baden-Württembergs im Bereich Umwelttechnologie  
**Frank Marscheider-Weidemann**

Zusammenstellung möglicherweise regulierungsbedürftiger Stoffe im Sinne der REACH-VO unter Berücksichtigung der Literatur, Umweltbeobachtung, anderer Rechtsbereiche und Stofflisten nichteuropäischer Länder  
**Frank Marscheider-Weidemann**

Marktstudie zum Bioethanoleinsatz in Brennstoffzellenanwendungen  
**Frank Marscheider-Weidemann**

BDI-Umweltpreiswettbewerb 2007/2008 in Verbindung mit dem Europäischen Umweltschutzwettbewerb  
**Frank Marscheider-Weidemann, Gerhard Angerer**

Rohstoffbedarf für Zukunftstechnologien – Einfluss des branchenspezifischen Rohstoffverbrauchs in rohstoffintensiven und -sensiblen Zukunftstechnologien auf die zukünftige Rohstoffnachfrage  
**Frank Marscheider-Weidemann, Gerhard Angerer**

Diffusion of innovations in energy efficiency and in climate change mitigation in the public and private sector  
**Katrin Ostertag**

Planspiele zum interkommunalen Handel mit Flächenausweiskontingenten  
**Katrin Ostertag**

Phosphorrecycling – Ökologische und wirtschaftliche Bewertung verschiedener Verfahren und Entwicklung eines strategischen Verwertungskonzeptes für Deutschland  
**Christian Sartorius**

Foresight and Assessment for Environment Technologies  
**Christian Sartorius**

Wirkungen des globalen Wandels auf den Wasserkreislauf im Elbegebiet – Ergebnisse und Konsequenzen  
**Christian Sartorius**

Klimaanpassungsstrategien  
**Christian Sartorius**

Adaptation and Mitigation Strategies: Supporting European Climate Policy  
**Wolfgang Schade**

HOP! – Macro-economic impact of high oil price in Europe  
**Wolfgang Schade**

Integrated Transport and Energy Baseline until 2030  
**Wolfgang Schade**

Sustainable Cars IPTS  
**Wolfgang Schade**

Pathways for Carbon Transitions  
**Wolfgang Schade**

Wirtschaftliche Bewertung von Maßnahmen des Integrierten Energie- und Klimaprogramms IKEP  
**Wolfgang Schade**

Vorplanung zur Modernisierung und Anpassung der bestehenden Wasserinfrastrukturkonzepte in Lawalde-Streitfeld an die demographischen Veränderungen  
**Jana von Horn**

Vorplanung zur Modernisierung und Anpassung der bestehenden Wasserinfrastrukturkonzepte in Neuensalz-Altensalz an die demographischen Veränderungen  
**Jana von Horn**

# PROJECTS | VISITING RESEARCHERS

Erneuerbare Energien aus Sicht der Innovationsforschung: Synopse der relevanten Literatur und Synthese für den Special Report des IPCC zu Erneuerbaren Energien (SRREN)  
**Rainer Walz**

Verbundvorhaben: Integration von Sustainability-Innovationen in Catching-up-Prozesse, Teilvorhaben: Anforderungen, sektorale Innovationsbedingungen und Maßnahmen  
**Rainer Walz**

## EMERGING TECHNOLOGIES

### PROJECTS AND CONTACT PERSONS

Researching Inequality through Science and Technology (RESIST)  
**Bernd Beckert, Ulrich Schmoch**

Converging technologies and their impact on the social sciences and humanities (CONTECS)  
**Bernd Beckert, Michael Friedewald**

Health Innovation Technology Assessment (HITE)  
**Bernhard Bührlen**

HTA-methodology for innovative healthcare technologies (Inno-HTA)  
**Bernhard Bührlen**

Biomedizinische Innovationen und Klinische Forschung – Wettbewerbs- und Regulierungsfragen  
**Bernhard Bührlen**

MetaForum „Innovation im medizinischen Bereich Gesundheitswesen“  
**Bernhard Bührlen**

Comprehensive evaluation of innovative healthcare technologies  
**Bernhard Bührlen**

European Perspectives on the Information Society (EPIS06)  
**Michael Friedewald**

Privacy and Trust in the Ubiquitous Information Society (PriTUIS)  
**Michael Friedewald**

E-safety Vehicle Intrusion proTected Application (EVITA)  
**Michael Friedewald**

Zukunftsreport: Ubiquitous Computing  
**Michael Friedewald**

Intellectual Property Rights and Diagnostics  
**Sibylle Gaisser**

Genomic knowledge and technologies: Exploratory research for setting up a research agenda for the integration of genomics into health services  
**Sibylle Gaisser**

Trends in Global Preclinical Biopharmaceutical Research  
**Sibylle Gaisser**

Towards a European Strategy for Synthetic Biology (TESSY)  
**Sibylle Gaisser, Bernhard Bührlen**

Zukunftsreport Individuelle Medizin und Gesundheitssystem  
**Bärbel Hüsing**

Diskursprojekt Die personalisierte Medizin im Gesundheitssystem der Zukunft  
**Bärbel Hüsing**

FAZIT-Forschung: Neue Märkte für Informations- und Medientechnologie in Baden-Württemberg  
**Simone Kimpeler**

Beitrag der Creative Industries zum Innovationssystem am Beispiel Österreichs  
**Simone Kimpeler**

Wissenschaftliche Evaluierung und Begleitung des Modellversuchs „Öffentliche Petition“ des Deutschen Bundestages  
**Ralf Lindner**

Medizintechnische Innovationen – Herausforderungen für Forschungs-, Gesundheits- und Wirtschaftspolitik  
**Ralf Lindner**

Strategiefondsprojekt Policy-Empfehlungen und Politikberatungspraxis  
**Ralf Lindner**

Marktpotenzial- und Wettbewerbsanalysen für ein ausgewähltes Geschäftsfeld eines Industrieunternehmens  
**Michael Nusser**

BioVT  
**Michael Nusser**

European Techno-Economic Policy Support Network (ETEPS)  
**Thomas Reiß**

Complexity – from nano to large electronic systems (ComplexEIT)  
**Thomas Reiß**

Developing Universities – The evolving role of academic institutions in economic growth. The public and private appropriation of knowledge  
**Thomas Reiß**

Der BMBF-Foresight-Prozess  
**Thomas Reiß, Kerstin Cuhls**

Robotics in Health Care  
**Axel Thielmann, Kerstin Cuhls**

Forschungs-Informations-System Mobilität, Verkehr und Stadtentwicklung  
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**Peter Zoche**

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**Andrea Zenker**

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### PROJECTS AND CONTACT PERSONS

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Verbundprojekt: Standards für wohnungsbegleitende Dienstleistungen im Kontext des demografischen Wandels und der Potenziale der Mikrosystemtechnik (StaDiWaMi)  
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DIN-INS, Basisuntersuchung – Identifikation zukünftiger Standardisierungsfelder  
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Promoting Innovation via Standards in Public Procurement (STEPPIN)  
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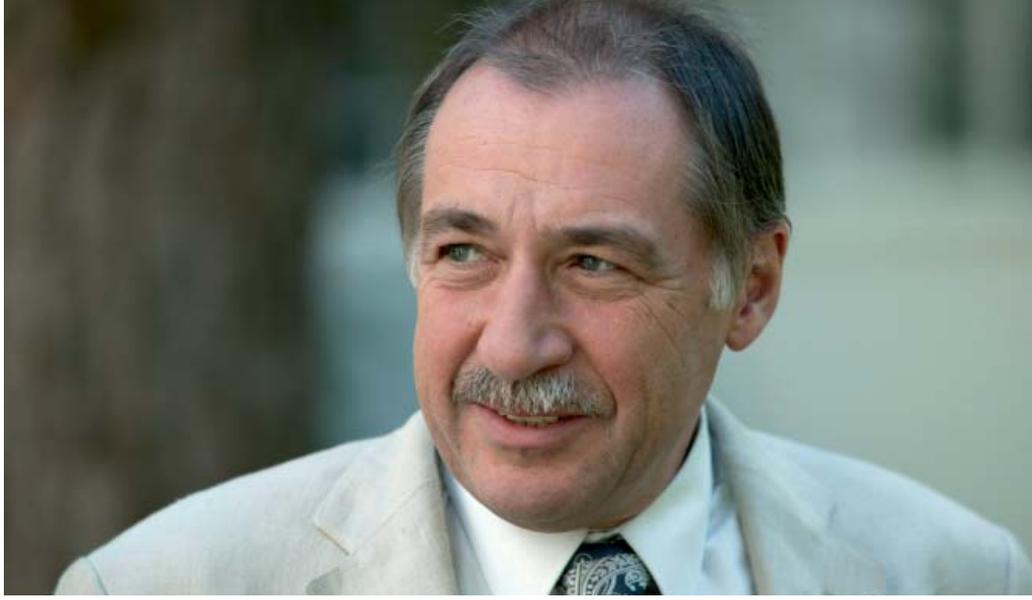
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## HARIOLF GRUPP IS DEAD

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Hariolf Grupp died on 20 January 2009 in Karlsruhe. As its deputy head and acting director for many years, he left his distinctive mark on the Fraunhofer Institute for Systems and Innovation Research ISI. Since 2008 he was also Managing Director of the Institute for Economic Policy and Economic Research (IWW) at the University of Karlsruhe. In 1988 he received the Fraunhofer Prize for the development of new indicators to measure techno-economic change. He placed his outstanding consulting competence at the disposal of the Scientific Technical Council of the Fraunhofer-Gesellschaft, whose vice chairman he was from 1989 until 1996.

Hariolf Grupp deeply influenced innovation research both nationally and internationally with his all-embracing expertise and enriched the Fraunhofer-Gesellschaft with his commitment. As a member of numerous boards and committees, such as the Commission of Experts for Research and Innovation (Expertenkommission Forschung und Innovation – EFI) of the federal German government, he contributed immensely to the reputation of the Fraunhofer-Gesellschaft.

We have lost a distinguished scientist and a great personality. Our deepest sympathy goes to his wife and children.

Management, Board of Trustees and Staff of the Fraunhofer Institute for Systems and Innovation Research ISI, Karlsruhe





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