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FRAUNHOFER INSTITUTE FOR SYSTEMS AND INNOVATION RESEARCH ISI

ANNUAL REPORT 2013

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The Fraunhofer Institute for Systems and Innovation Research ISI analyzes the origins and impacts of innovations. We research the short- and long-term developments of innovation processes and the impacts of new technologies and services on society. On this basis, we are able to provide our clients from industry, politics and science with recommendations for action and perspectives for key decisions. Our expertise lies in a broad scientific competence as well as an interdisciplinary and systemic research approach.

CONTENTS

COMPETENT ADVICE FROM DIFFERENT PERSPECTIVES

The growing networks of political and economic systems on the EU level as well as the global level increase the demand for advice which meets these needs. The Fraunhofer Institute for Systems and Innovation Research ISI responds to this demand for in-depth decision support. Due to its systemic approach it can advise actors from politics and industry comprehensibly and from different perspectives. The Fraunhofer ISI helps to identify complex systems and define objectives. In the year 2013, the teams, which work in an inter- and transdisciplinary manner, were able to develop evaluations and expert opinions for complex issues in more than 380 projects and help their German and European clients from politics, industry and society to make informed decisions.

The Fraunhofer ISI does not understand innovations on the different system levels as purely technical phenomena. They are also related to services or organizations and can trigger processes. The Fraunhofer ISI defines "innovation" in the broadest possible sense and thus looks at the entire innovation chain. It sees the targeted process which needs the right environment to be successful and to bring about the desired changes.

To this end, the seven scientific Competence Centers deal with questions relevant to our time. The tremendous need for competent advice is reflected in the continuously increasing number of commissions resulting in a rise of the Institute's budget to 24 million euros in 2013. At the same time, the number of staff grew to nearly 250 which almost exhausted the available space of the building in Breslauer Strasse. For this reason and due to necessary restoration works, four Competence Centers have moved temporarily to a Fraunhofer ISI building on the site of the former Pfizer factory in nearby Karlsruhe-Hagsfeld. As soon as the renovations have been finished, the Competence Centers will again be on one site.

The strategy audit reviews the Institute's strategic and conceptual orientation and is conducted at regular intervals at all Fraunhofer institutes. The Fraunhofer ISI completed this audit successfully and its importance within the Fraunhofer-Gesellschaft and as an actor of international innovation research was highlighted.

In a world which is becoming more and more interconnected, cooperations are important elements in order to build and maintain innovation capacity. Therefore the Fraunhofer ISI has a number of cooperations in Germany and abroad and is also a member of different associations and alliances within the Fraunhofer-Gesellschaft. Since May 2013 the Fraunhofer ISI has been able to advance its international network even further. Together with the Institute of Policy and Management of the Chinese Academy of Sciences (CAS-IPM) in Beijing, it established the "Joint Center for Innovation Research of IPM in Collaboration with the Fraunhofer ISI". Two colleagues in Beijing support our commitment in China.

We are looking forward to continuing close cooperations with our research partners and clients. We are also looking forward to many exciting projects in 2014 when we can demonstrate our experts' methodological strengths and enthusiasm for research. In future, the Fraunhofer ISI will also continue to guarantee that research is conducted from different perspectives. As an actor of international innovation research, the Fraunhofer ISI will thus make a social contribution to creating the right conditions for innovations to flourish.

Prof. Marion A. Weissenberger-Eibl
Director of the Institute

Dr. Harald Hiessl
Deputy Director of the Institute

THE KEY THING IS NOT THE DEGREE OF COMPLEXITY, BUT WHETHER I AM CAPABLE OF CONTROLLING IT

A high-performance society has to be able to handle complexity. Despite increasing knowledge, orientation within the different systems is often difficult. The degree of complexity is not the decisive factor here, but how we handle it.

Discussion between Professor Marion A. Weissenberger-Eibl, Director of the Fraunhofer ISI, and the Chairman of the Board of Trustees, Dr. Manfred Wittenstein

Frau Weissenberger-Eibl, at the moment everybody seems to be talking about "complexity" and "networking". How do you see this with regard to questions of management?

Weissenberger-Eibl: It is unfortunate that these terms are being banded about so widely and so imprecisely, especially as these abstract terms actually conceal exciting challenges. These are of course particularly interesting if we set aside their everyday meaning and look at questions concerning research or business.

"NETWORKING AND COMPLEXITY WILL INCREASE WITH THE 4TH INDUSTRIAL REVOLUTION"

Herr Wittenstein, as a businessman, how do you see the current development with a view to production? Will things become more complex in the future?

Wittenstein: I assume that the 4th industrial revolution we are currently experiencing will mean a continued increase in both the degree of networking and complexity. In an internet of data and services, cyber-physical systems will be increasingly equipped with their own decentralized control systems and regulate themselves.

Are more networking and complexity necessary in order to remain productive?

Wittenstein: I believe it a fallacy to conclude that high productivity can only be achieved by increasing complexity. In point of fact, under certain circumstances, reducing complexity can actually mean a productivity increase, especially as many companies have problems managing the intrusive external demands made of them.

Weissenberger-Eibl: The goal cannot be to reduce complexity at all costs, but to first understand the system itself. I cannot improve something, restructure it, or even "simplify" it, if I have no grasp of the underlying structures as a whole.

Wittenstein: Of course, this is the basis. Even partial changes cannot be made until this is the case.

Weissenberger-Eibl: I believe the key issue here, therefore, is not the question about the degree of complexity, but whether I am capable of controlling it. Obviously, the more complex a system is, the harder it is to understand. But a lack of knowledge makes "intelligent" design harder.

Wittenstein: I can only support this approach. We have to take deliberate control of things. We have to use expertise to tackle problems holistically. If necessary, we have to consult experts who can help us to do this.

What contribution can the Fraunhofer ISI make here?

Wittenstein: Based on its expertise and transdisciplinary teams, the Fraunhofer ISI has the necessary competence, clarity and orientation to provide its clients with strategic options. Its systemic approach provides the necessary solid foundation.

Weissenberger-Eibl: We indicate options and provide help with plotting the right course and making important decisions. In this way, we support decision-makers in politics and industry in setting goals and offer the perspectives needed for the relevant questions: Where do we want to be tomorrow, what do we want to have achieved and what can we expect?

"GERMANY IS ONE OF THE MOST INNOVATIVE COUNTRIES IN THE WORLD"

Let's look at competitiveness. What is your view of Germany's innovativeness?

Weissenberger-Eibl: Germany is currently in the process of catching up with the leaders. The latest figures from our Innovation Indicator survey prove that Germany is still one of the most innovative countries in the world. I would like to emphasize, however, that this is not only thanks to its strong economic performance. Science and research also make a decisive contribution here. They help to create the right conditions for innovation to flourish.

Wittenstein: Germany's economy is a role model for many other nations because it is particularly successful in producing technically complex and high quality products like machines, installations or vehicles which are in strong demand on global markets.

Where do we still need to act – where do we need to reconsider?

Wittenstein: If Germany wants to continue to belong to the world's economically most successful countries and remain internationally competitive, we have to use energy and resources even more intelligently and efficiently in the future.

"ENERGY-SAVING MEASURES GENERATE PROFITS IN THE SHORT TERM"

Weissenberger-Eibl: We found out that just the energy-intensive industries in Germany on their own could save about 15 percent of energy by 2035. These saving potentials should definitely be realized given the fact that about one third of Germany's total energy consumption is currently accounted for by manufacturing industry.

Wittenstein: I find it interesting that the majority of energy-saving measures do not even cause the companies additional costs, but actually quickly start to generate profits. This is why high energy and resource efficiency can help to strengthen the German economy in global competition.

How can we keep up internationally as an industrialized nation?

Weissenberger-Eibl: It has been clear since the financial and economic crisis at the latest that flexibility and adaptability provide a competitive edge. Our ability to compete globally is also characterized by more intelligent organization. A key aspect is being able to manage complex systems and processes.

Wittenstein: Let's take a look at production in the future for instance. It will increasingly present us with the challenge of

having to react at short notice. I think this will become a strategic competitive advantage for German industry. The industry of the future will operate much more rapidly, flexibly, and resource-efficiently. It will have to become more intelligent.

Do you view the future optimistically?

Wittenstein: I am basically optimistic. However, our prosperity is based on progress, productivity and the ability to change structures. In order for us to continue to develop, we have to turn away from entrenched ways of thinking and make an effort in every social domain.

"LINKING APPLICATIONS AND TECHNOLOGIES INTELLIGENTLY AND IN LINE WITH DEMAND IS A CHARACTERISTIC OF THE GIGABIT SOCIETY"

And what is our destination? More and more networking – outside businesses as well?

Weissenberger-Eibl: The changes affect the whole of society. After the "information society", we are now talking about the "gigabit society". In the future even larger amounts of data will be transferred even faster, automatically generated information from multiple sources will be intelligently interlinked, smart appliances will process the relevant data in real-time and combine these as required.

What impacts will complex information technology and network-related innovations have on our daily lives?

Weissenberger-Eibl: Very different domains will be affected. I'm thinking, for example, about networking applications coupled with intelligent electric mobility and new transport concepts. There could also be major changes with regard to the possibilities for political participation.

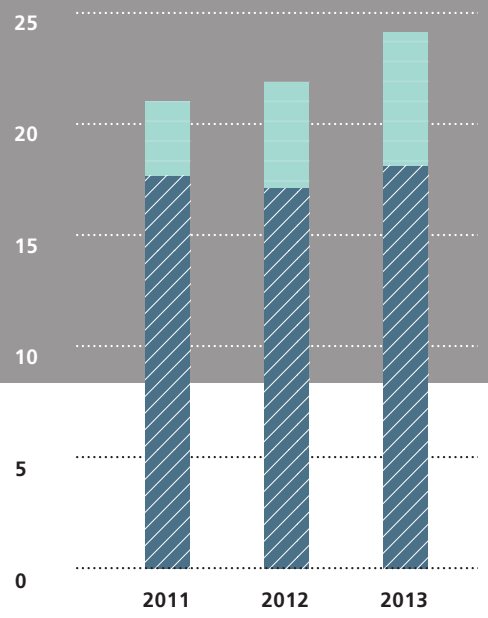
Wittenstein: Personally, I find the developments with regard to intelligent integrated mobility and smart home communication particularly exciting, as well as education networks with the help of the digital community.

How will people cope with this flood of information in the gigabit society?

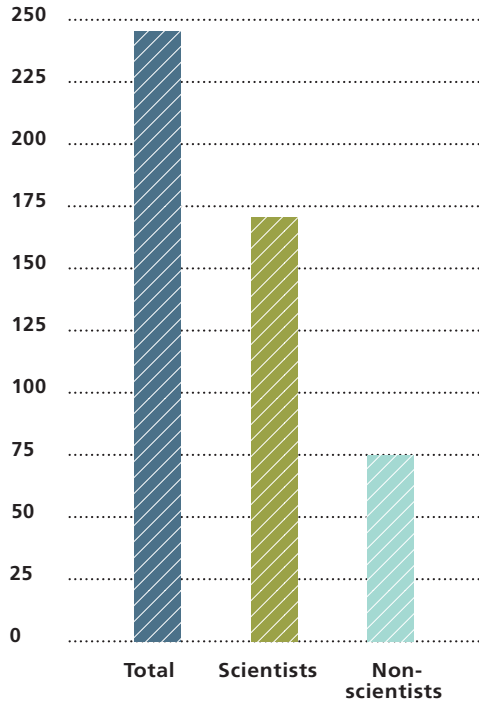
Weissenberger-Eibl: We will learn to cope with it. We will acquire new skills for dealing with digital networking – a process that has already begun, but which will not proceed without friction. The important thing is that nobody gets left behind and especially that we are able to determine ourselves what happens to our own personal data.

Thank you!

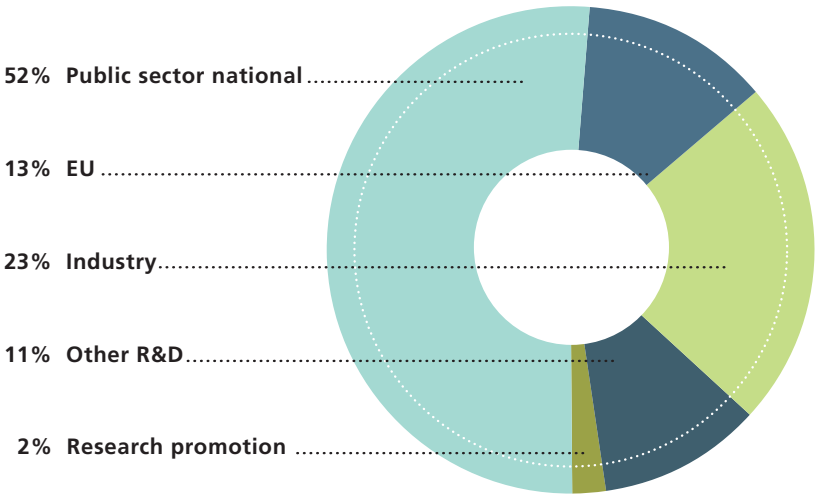
This interview was conducted by Anne-Catherine Jung.



Development of turnover 2011 – 2013 (in million euros)



Number of staff



Clients

MAIN TOPIC 1

SCIENTIFICALLY-BASED ADVICE FOR POLITICAL DECISIONS

Scientifically-based policy advice is a core competence of the Fraunhofer ISI. The systemic view integrates all aspects so that the decision-makers are fully prepared for future challenges and possible developments. German federal ministries and directorate-generals of the European Union are amongst our clients. In 2013 the current and future research and innovation landscapes and questions regarding the energy transition were among the issues that were analyzed.

Independence, scientificity, competence, plurality and interdisciplinarity are an important basis for its advisory activities.

The Fraunhofer ISI has defined several criteria of good practice for its policy advice. Independence, scientificity and competence as well as plurality and interdisciplinarity are an important basis for its advisory activities in the context of evidence-based advice. Networking across different disciplines and organizational structures as well as cooperations with other research and advisory facilities also play a major role.

By understanding political decision-making processes the Fraunhofer ISI can respond to conflicting political interests. The scientists are in continuous dialog with their clients, they can guide and accompany learning processes, foresight and scenario developments. They process the results of their advice clearly and, if possible, make them accessible to the public through publications and lectures.

Promoting public-private partnerships

The Federal Ministry of Education and Research (BMBF) is an important client in the area of policy advice. In 2012 it started the funding initiative "Research Campus – public-private partnership for innovations". It funds the development of medium- to long-term public-private partnerships under one roof where science and industry cooperate at an early stage and intensively in joint projects.

The Fraunhofer ISI was commissioned to provide scientific support. In the project "Research Campus – pro active", it enhances the initiative with scientific analyses and communication instruments together with the project partner VDI/VDE Innovation + Technik GmbH. At the same time the scientists continually exchange experiences with the BMBF, the project management organization and the research campus models. The findings should allow conclusions to be drawn about the future viability and sustainability of the funded models and help to further develop the initiative and support the research campuses.

Demand-oriented innovation policy for societal challenges

The Fraunhofer ISI together with VDI TZ is also carrying out the current second cycle of the foresight process for the BMBF. It started in the spring of 2012 with an extensive search and analysis phase of societal developments within the 2030 time horizon. Unlike the first cycle, which started with a focus on technological developments, the current cycle starts with societal demands on research and innovation. To this end, societal demands ("Demand Pull") are identified, innovation policy challenges analyzed and linked to future technological developments ("Technology Push") and thus new approaches towards a stronger demand-oriented research and innovation policy are identified. By doing so, the foresight process of the BMBF contributes to the mission-orientation and further development of the high-tech strategy.

Anticipating and making use of tensions in the innovation landscape

The Fraunhofer ISI not only shapes German innovation policy, but also contributes to the future viability of the European Research Area. The project RIF 2030 (Research and Innovation Futures 2030) developed scenarios for the European research landscape of the coming decades for the European Commission. The project team has investigated how future developments in research and innovation will lead to tensions and dilemmas in the medium term. The explorative scenarios, described for the year 2020, show, amongst other things, that it might be difficult to coordinate research due to an increasing fragmentation of the innovation landscape, stronger competition for limited funding and the risk that an academic career is becoming less attractive.

With the help of foresight processes and innovation policy advice, possible future challenges in society and research can be recognized and strategies can be developed.

On this basis, long-term transformative scenarios with strategic options for the research landscape in 2030 were developed. Scientific self-governance in a networked decentralized research landscape with high participation rates of citizens, experiments with solutions to societal challenges in socio-technical laboratories and a very high degree of specialization in the international research landscape were examined.

Competitiveness through innovation

Research and innovation are crucial for making a country competitive. The "Innovation Indicator 2013", compiled by the Fraunhofer ISI and two other research institutes, shows the situation in Germany: Its strong economy and science put Germany in 6th place when compared to 28 industrial countries. For Germany to retain or even improve this position, the project team's recommendations include improving the perspectives for young researchers and increasing cooperation in the field of education.

The project "RIM Plus" aims to contribute to the competitiveness of European regions by making regional innovation policies and strategies more effective. It is based on the "Regional Innovation Monitor", which the Fraunhofer ISI established together with two partners. Analytic tools which help to recognize the strengths and weaknesses of regional policies and innovation

systems are developed for politicians, researchers and other stakeholders in the innovation system. Regional strategies to promote innovations are closely examined in scientific publications; the project partners exchange ideas with decision-makers from politics, industry and society in regular workshops.

Advice for the energy transition

The energy transition is an important topic at the national and European level. Greenhouse gas emissions are to be reduced and a key measure to achieve this objective is the expansion of renewable energies. Every four years the German Federal Government has to submit a progress report to the German Federal Parliament about the state of the technology development and market introduction of renewable energies in the heat sector. The Fraunhofer ISI provides technical support for this report and investigates the effectiveness of policy instruments with the help of scenarios. The researchers found out that the amount of renewable energies in the heat sector is growing rather discontinuously. The German Renewable Energies Heat Act (EEWärmeG) introduces important standards for heat supply in new buildings based on renewable energies, but does not address the existing building stock. The market incentive program gave an impetus to invest; however, it suffers from uncertainty about the budget which has been allocated. Budget-independent support could stabilize and strengthen the expansion of renewable energies in the heat sector.

Network charging methodology on trial

The expansion of renewable energies should not only be promoted in the heat sector but also in the electricity sector which partly requires substantial investments in networks. The Fraunhofer ISI is working on a study on the "Requirements of the integration of renewable energies on the regulation of network charges" for the German Federal Environment Agency. This study investigates whether the present network charging system is suitable for the transformation of the electricity supply system towards renewable, partly fluctuating, energy sources.

The development of renewable energies requires a systemic view of obstacles and deficits in order to formulate recommendations for policy-makers.

To this end, the present situation is analyzed from a legal, economic and technical perspective. Obstacles and deficits which hamper the transformation towards a largely renewables based electricity supply are to be identified. Based on this analysis, the researchers want to suggest to political decision-makers how to further develop the network tariff methodology and network use systems. The comprehensive perspective of the analysis, which involves both the producer and the consumer, guarantees the sustainability of the intended further development.

MAIN TOPIC 2

PROMOTING THE COMPETITIVENESS OF ENTERPRISES THROUGH TARGETED ADVICE

Besides cost-effective and efficient production, companies must have an increasing degree of flexibility in order to compete both nationally and internationally. The Fraunhofer ISI shows commercial enterprises the options, potentials and risks in fields like smart production systems, resource efficiency or emerging technologies and in this way contributes to safeguarding the competitiveness of the German economy.

"Smart factories" make Germany's economy and industries fit for the future.

Networked, efficient, adaptable and sustainable – these keywords conceal the challenges German companies have to face in the near future. Only if they manage to adapt to the changing conditions on national and international markets and channel their production along energy- and resource-efficient lines will they be able to remain competitive in the future. The German government's high-tech strategy also highlights these points under the heading "Industry 4.0". The primary objective is to equip German industrial enterprises as "smart factories" for the future with networked and intelligent production systems, which make it possible for them to adapt more rapidly to changing consumer demands and integrate these to a greater extent in value-added processes.

Revealing the potentials and risks of future technologies

For companies to be "fit" for the future, they have to embark on the right course in good time. The Fraunhofer ISI is therefore working intensively on emerging technologies like generative production processes or intelligent production systems, which are interlinked and retrieve data from the internet on their own to some extent in order to monitor themselves. With its extensive know-how, the Fraunhofer ISI advises enterprises, shows them the future potentials and risks of new manufacturing technologies and production paradigms and accompanies their practical implementation. The industry benchmarking portal (www.industriebenchmarking.eu) is an important tool here that gives interested companies the chance to compare their own performance and innovation and modernization strategies with other manufacturing companies online. The benchmarking is based on key data from 1,600 companies and enables enterprises to recognize their own need for optimization and how to tackle this.

Questions of energy and raw material efficiency are also increasingly relevant to safeguard competitiveness in the long term. It is important to find ways to use finite raw materials more efficiently and then to use these savings to improve productivity. The funding initiative of the German Federal Ministry of Education and Research (BMBF) "Resource efficiency in production" is dedicated to these issues. Together with the German Engineering Federation (Verband Deutscher Maschinen- und Anlagenbau e. V., VDMA), the Fraunhofer ISI is responsible for accompanying 31 research projects, in which about 160 companies and 40 research institutes work together and receive information about the latest research results and innovations from the field of resource-efficient production. The partners then use these to develop relevant technologies to improve resource efficiency. In addition, the Fraunhofer ISI conducted additional analyses in this field which showed companies the economic potentials of resource-efficient production and highlighted the importance of corporate energy management.

Developing new key technologies to strengthen the German economy

For the long-term success of German industry, the development of new key technologies in the energy sector plays an increasingly important role. For example, in the research project "Energy storage monitoring for electric mobility-EMOTOR", sponsored by the German Federal Ministry of Education and Research, the Fraunhofer ISI is concerned with Germany's progress as an industrial manufacturing location in the field of energy storage technologies, how this can be measured in an international comparison and how Germany can become a lead supplier here. In order to determine this, an innovation system analysis was conducted that compares different countries like Japan, South Korea, China, the USA, France and Germany and analyzes the current state of the art as well as future trends of battery technologies. The results so far indicate that there are only chances for German enterprises to develop the production of competitive battery cells in the long term, and that their specific strengths lie in concentrating on the quality and safety of the battery system as a whole. These skills can be used for instance to integrate current battery technologies into different vehicle concepts.

Smart production systems, new key technologies in the energy sector and greater resource efficiency support Germany's progress as a manufacturing location.

Products and technologies like those in the battery technology sector are in great demand worldwide, which means that German enterprises also have to deal with internationalization issues. In this context, the Fraunhofer ISI has the relevant skills to support companies and was commissioned by the local Chamber of Commerce and Industry (IHK) in Karlsruhe to conduct the study "Safeguarding companies' innovative capacity in the context of globalized markets". Specific questions included the link between the internationalization of companies situated in the IHK's district of Karlsruhe, their research and development activities and the future qualification requirements of their personnel and how these factors influence their innovative capacity. The results corroborate that many large and medium-sized companies in and around Karlsruhe

regard globalization as a huge opportunity for product sales and are already strong exporters. The integration in international value-added chains is also reflected in staff qualifications because corporate innovation processes are strongly influenced by academics.

Expanding international research activities with a focus on the BRIC countries

In light of the increasing economic relevance of the so called BRIC countries – Brazil, Russia, India and China – the Fraunhofer ISI is extending its research activities with regard to these countries and their prevailing market conditions and advises domestic and European enterprises seeking to do business there. In particular, the long-standing (since 2007), close cooperation between the Fraunhofer ISI and the Institute of Policy and Management of the Chinese Academy of Science (CAS-IPM) in Beijing, China was further intensified and institutionalized by the foundation of the Joint Center for Innovation Research with CAS-IPM in Beijing in May 2013. Currently, two members of the ISI are working full-time at the Joint Center in Beijing. Their presence on location has additionally enhanced the Fraunhofer ISI's specialized knowledge of China and its innovation system. The Joint Center advises companies on projects in the fields of "innovation strategies", "renewable energies and energy efficiency", "urban transport systems", "urban water infrastructure systems" and "intellectual property" and supports the technical and economic development of the Chinese market as well as application-oriented scientific cooperation in these areas.

The global demand for products and technologies leads to greater internationalization and the expansion of research activities.

Even if the trend of German companies outsourcing activities to China is set to continue, the bigger picture is that such relocations are declining: Only about eight percent of German enterprises shifted parts of their production abroad in 2012, while two percent have shifted back again to Germany. This is the finding of the Fraunhofer ISI's 2012 survey "Modernization of Production", which is conducted every three years. The main reasons for returning to Germany are the limited flexibility of the facilities abroad and insufficient quality standards. German enterprises are still in a strong position internationally, however, because about 21 percent of the total production capacities of German manufacturing industry are situated aboard, which is equivalent to a gross production value of about 390 billion euros.

MAIN TOPIC 3

THE ECONOMY, SOCIETY AND ECOSYSTEMS ALL BENEFIT FROM NEW DEVELOPMENTS

Introducing new technologies for the more efficient use of scarce resources, and improving tried and tested ones not only saves companies costs, but also benefits the ecosystem. If, in addition, companies are able to react to rapidly changing surroundings and market conditions in the globalized economy, they gain strategic competitive advantages over their rivals.

Companies are constantly modernizing and adapting their organization. Improving the efficiency of workflows and production processes is a continuous task as is maintaining and enhancing the knowledge base of staff and their skills. At present, companies' modernization strategies are focusing on the development and improvement of technical production processes. The reasons are radical changes in technology like electric mobility and rationalization strategies driven by technology developments in energy, resource and material efficiency.

In the future, the competitiveness of companies will be influenced by the flexibility, resource efficiency and energy efficiency of production, as well as by innovative value concepts.

High agility due to hybrid value-added concepts

For some time now, a shift has been visible in various traditional value chains towards selling the function a product is intended to fulfill, rather than the product itself. Combining products and services in one package is characteristic for these "hybrid value-added concepts". Economic objectives are often the main reason for doing this, e.g. profit maximization. In the "HyWert" project, the Fraunhofer ISI determines the impacts of innovative, hybrid value concepts in selected production areas in economic, ecological and social sustainability terms and develops recommendations for how potentials can be exploited and risks avoided.

Energy-efficient due to "green" communication technologies and process optimization

New thinking is not only required in the value-added architecture in order to remain competitive, but new approaches to energy efficiency are also needed in production processes and when manufacturing new products for final consumers. For example, the changing information society also impacts electricity consumption: Net-based services and information and communication technology (ICT) infrastructures are developing into ever larger consumers. Germans' use of the internet alone has increased by 24 percent over the last two years; 34 percent of those with a mobile phone already use it to regularly surf the internet.

These developments are a growing burden on energy reserves because, even though appliances are becoming more and more efficient, in total, they need increasing amounts of energy and resources. With its "IT2Green" technology program, the German Federal Ministry of Economics

wants to promote environmentally- and resource-friendly ICT. Together with the Fraunhofer IZM, the Fraunhofer ISI is supporting research projects in data centers, telecommunication networks and office and domestic applications that lower energy consumption and target energy and resource savings.

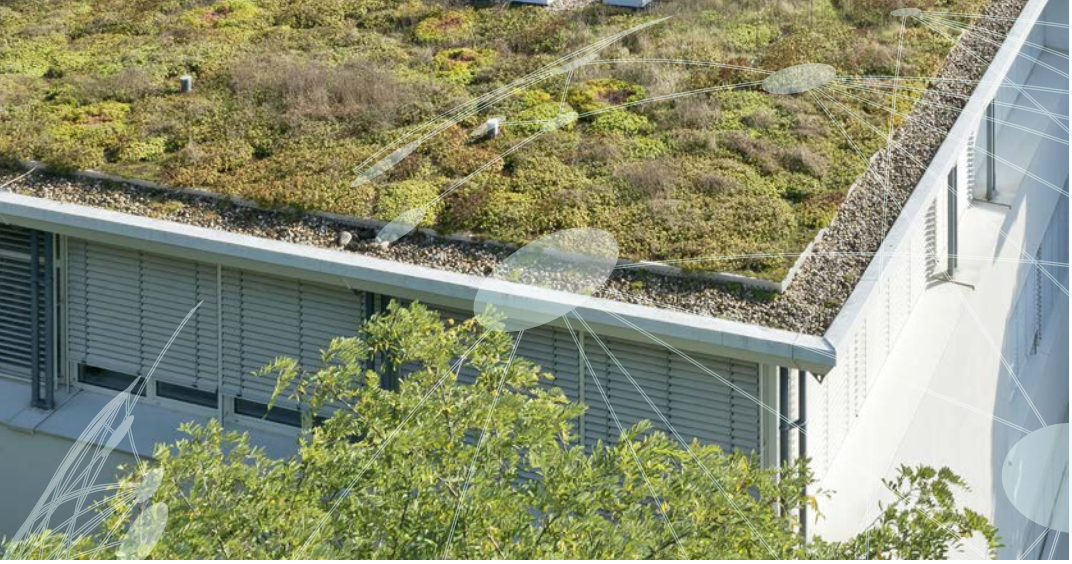
Since the manufacturing industry accounts for almost 30 percent of the total final energy consumption in Germany, improved energy efficiency in this sector is decisive for a successful transformation of the overall energy sector, which plans to lower the annual greenhouse gas emissions in Germany by 40 percent by 2020 compared to 1990. The saving measures examined by the Fraunhofer ISI, which can be realized by 2020, would make it possible to avoid about 22 million tonnes of CO_2 equivalents each year in energy-intensive industry. Besides short-term saving measures like optimized production management, in the long term (up to 2050), mainly new methods and radical process innovations offer the desired saving potential. Examples for these include making cement at much lower process temperatures or near net shape steel casting.

For Germany's "Energiewende" to succeed, manufacturing industry has to become more energy-efficient.

There are also saving potentials for the energy used in residential and commercial buildings. As part of the ENTRANZE project, which is being coordinated by the Energy Economics Group at the Vienna University of Technology (TU Vienna), the Fraunhofer ISI together with its project partners developed a database, which maps building data from the European Union, Croatia and Serbia. In addition, policies, laws and incentives are studied and analyzed taking the different climatic conditions into account. This is done in order to support political decisions which favor country-compatible instruments to promote nearly zero-energy buildings as well as heating and cooling with renewable energies.

Raw materials security through recycling, resource efficiency and sustainable policy

Alongside the transformation of the energy sector, another political focus over the past few years has been on the stable supply of raw materials for Germany. Structural changes on global raw material markets and the steep rise in raw material prices for non-energy mineral resources are driving raw materials policy in a new direction. In the report for the Office of Technology Assessment at the German Bundestag (TAB) on specifying and further developing Germany's raw materials strategy, the Fraunhofer ISI addresses current developments and shows starting points for advancing Germany's raw materials policy. Important objectives here include increasing the security of supply, price stability and market transparency, coupled with lower resource consumption and cooperation with the countries mining the raw materials in a development policy oriented towards sustainability.



Electric mobility plays a decisive role in future urban mobility. It is essential to have a systemic perspective of the different factors influencing its success on the market.

The Fraunhofer ISI has developed a model especially for copper to illustrate the global production, use and recycling of this essential metal. The model traces the global flows of copper from 1910 and thus permits informed statements to be made on its whereabouts (in use, in stockpiles etc.) and on recycling indicators. This information provides an important foundation for decision-makers in industry and government when designing sustainable industrial and raw materials policies for the future.

New technologies make sustainable transport possible

The Fraunhofer ISI coordinates the innovation cluster "REM 2030", which is investigating the impacts climate protection and scarce resources will have on mobility in the future. Urban mobility in the future is made up of different components like vehicles and drive technologies, technical infrastructures, ICT use, intermodal transport approaches and operating models and has to be compatible with future trends like demographic change. This makes a systemic perspective essential.

Whether or not the goal of one million electric cars in Germany by 2020 will be met is a much debated issue. The Fraunhofer ISI addressed this question in its study "Market evolution scenarios for electric vehicles" on behalf of the German National Platform for Electric Mobility and the German National Academy of Science and Engineering. Alongside the prices for crude oil and electricity, the range of vehicles offered and the degree of acceptance of this new form of mobility will be decisive for the success of electric cars. Under optimistic assumptions, the goal of one million electric cars by 2020 can be met without having to subsidize car purchases.

The "Get eReady" project is also supporting this development. Its objective is to get a fleet of electric cars on the road in the region around Stuttgart by 2015 – made up of 750 hybrid and purely electric vehicles. Together with fleet operators, information is being gathered on how a large e-fleet can be operated economically in practice. It is being studied whether individual fleets and vehicles can be substituted by electric vehicles and what savings result from this.

MAIN TOPIC 4

SYSTEMIC SECURITY RESEARCH SERVING SOCIETY

Questions of security have always played a significant role for societies and are important for social and economic as well as political activities. Against this background, the Fraunhofer ISI researches a broad range of security issues from a systemic perspective. Relevant work also deals with the future orientation of security research or the social effects of security technologies.

The increased use of information and communication technologies requires a new perspective on security aspects of user data.

In the last few years, issues such as combating terrorism, dealing with climatic risks or supplying raw materials have repeatedly been the subject of public and political security debates and have had an impact on the agenda of security research. This is also true for security issues which arise from the increased use of information and communication technologies and discussions about how to deal with user data. In this area of conflict, the Fraunhofer ISI considers the conditions for innovation and competition of security services and technologies, questions of user acceptance and the resilience of infrastructure systems. The Fraunhofer ISI's systemic and interdisciplinary method analyzes the technical, social, economic and political aspects of security issues in their interdependencies.

Discussing the social dimensions of security research

The special systemic approach also characterizes the expert dialog security research which is chaired by a consortium under the guidance of the Fraunhofer ISI. It deals with the social dimensions of security research within the framework of the German government's high-tech strategy. The dialog mainly aims to further develop a network for relevant actors from the humanities and social sciences, to create scientific excellence as well as to promote a transdisciplinary and social exchange. In addition, the expert dialog security research provides strong support for the further development of research agendas and the definition of research needs.

However, the Fraunhofer ISI also investigates the issue of security from an international perspective and contributes to efficiently planning security research on a European level with projects such as "Evaluation of Critical and Emerging Technologies for the Elaboration of a Security Research Agenda (ETCETERA)". The focus here was on two key tasks: Global future scenarios 2025 had to be developed which served as the basis to evaluate emerging security technologies such as indoor navigation, homorphic encryptions, smart textiles or cognitive radio. The in-depth analysis of the future application and development potentials of these technologies in each scenario has taken into account economic, ecological, social, legal and political aspects as well as technological drivers and barriers. Another objective was to develop a socio-economic

evaluation model, which would estimate the future potentials of "emerging technologies" on a quantitative level.

Taking into account the users' perspective when developing security technologies

When developing new security technologies, the users' perspective should be included as well as technical or economic factors – this is particularly important as many citizens are generally skeptical about modern security technologies due to the data and monitoring scandals in the NSA affair. Against this background, the Fraunhofer ISI critically discusses the notion that greater public security can only be achieved by restricting fundamental rights such as protecting the privacy of individuals in the project "Privacy and Security Mirrors". This investigated the attitude European citizens have towards privacy and security and how this can be used to create acceptable security technology compliant with fundamental rights. The results based on a representative survey in the 27 EU Member States are used to support political decision-making processes as they make it possible to assess how citizens perceive concrete security technologies and measures.

The project "Security in Public Space (SIRA)" supported by the Federal Ministry of Education and Research also emphasizes that, especially in the early stages of innovation processes, the citizens' perspective has to be taken into account when developing new security technologies. As passenger numbers and new security requirements at airports are increasing, the challenge is to weigh up technical, economic and social interests and bring together the different positions of airport operators, air lines, security technology companies, political decision-makers and passengers. In this project, the Fraunhofer ISI developed an evaluation method which considers these different perspectives already in the early innovation phases. In particular, the focus was on whether the various actors involved accept or reject security technologies.

When advising decision-makers from politics and industry on security issues, the Fraunhofer ISI also deals with potential threats to society and how to handle them at an early stage. The project "European Security Threats and Trends in Society (ETTIS)" developed four scenarios for each of the areas environment, cyber infrastructures and nuclear that explore future threats to society. For example, in the area of environment, new needs of society arise due to climate change, loss of bio-diversity or the inefficient use of resources – and meeting them poses a challenge for the future. The study suggests that the best way to meet these needs is to define common achievable objectives and continually monitor them on an international level. In addition, cooperation between state and non-state actors should be encouraged.

Increase security at airports by using evaluation options at an early stage to capture the acceptance or rejection of security measures.

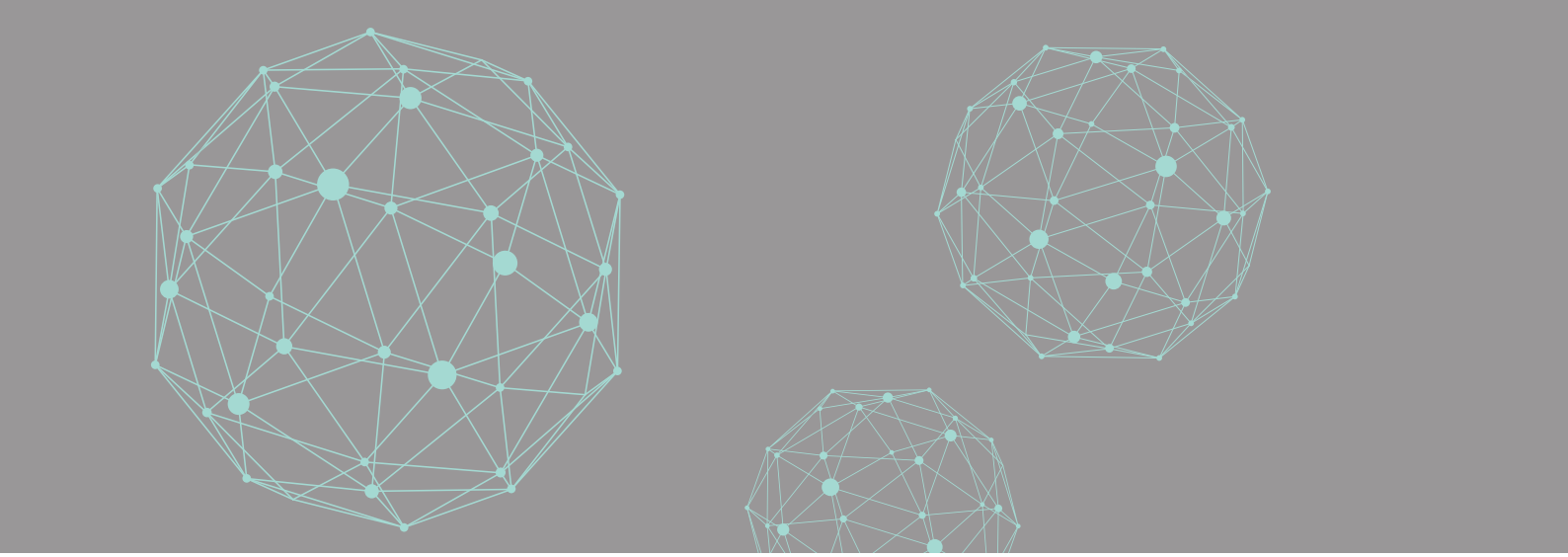
Counteracting potential environmental threats through sustainable use of resources

The sustainable use of resources plays an important role in counteracting threats in the environmental sector. The Fraunhofer ISI addresses this issue as well as issues such as raw material supply and security of supply, as the project "Challenges of sustainable water management" shows. The project deals with the future global demand and availability of water as well the requirements of water infrastructures. The results indicate that the demand for water will increase significantly worldwide and intensified water shortages will occur in certain regions due to climate change. Technological and organizational innovations in water resource management are needed to guarantee safe water supplies for future generations.

This is dealt with in the project "Protection of the supply of drinking water with regards to CBRN scenarios (STATuS)", in which the vulnerability of infrastructure systems is taken into account as well. Modeling water distribution networks and the socio-economic evaluation of possible chemical, biological or radioactive accidents or attacks on the drinking water supply reveal fundamental conflicts of objectives when achieving different protection goals and important measures to minimize the vulnerability of distribution networks and the level of damages caused by contamination. In addition, the interdependent issues of risk perception and risk/crisis communication play an important role. An appropriate guidebook was created for the implementation of communication strategies to address specific needs and as a trust building measure.

Technological and organizational innovations make the sustainable use of water possible and guarantee security of supply.

The Fraunhofer ISI works on various projects in the area of security research which contribute significantly to increasing civil security in Europe and emphasize that only a systemic and transdisciplinary approach makes a holistic consideration of security issues possible.



INTEGRATION OF METHODS AS A CORE ELEMENT OF A HOLISTIC EVALUATION

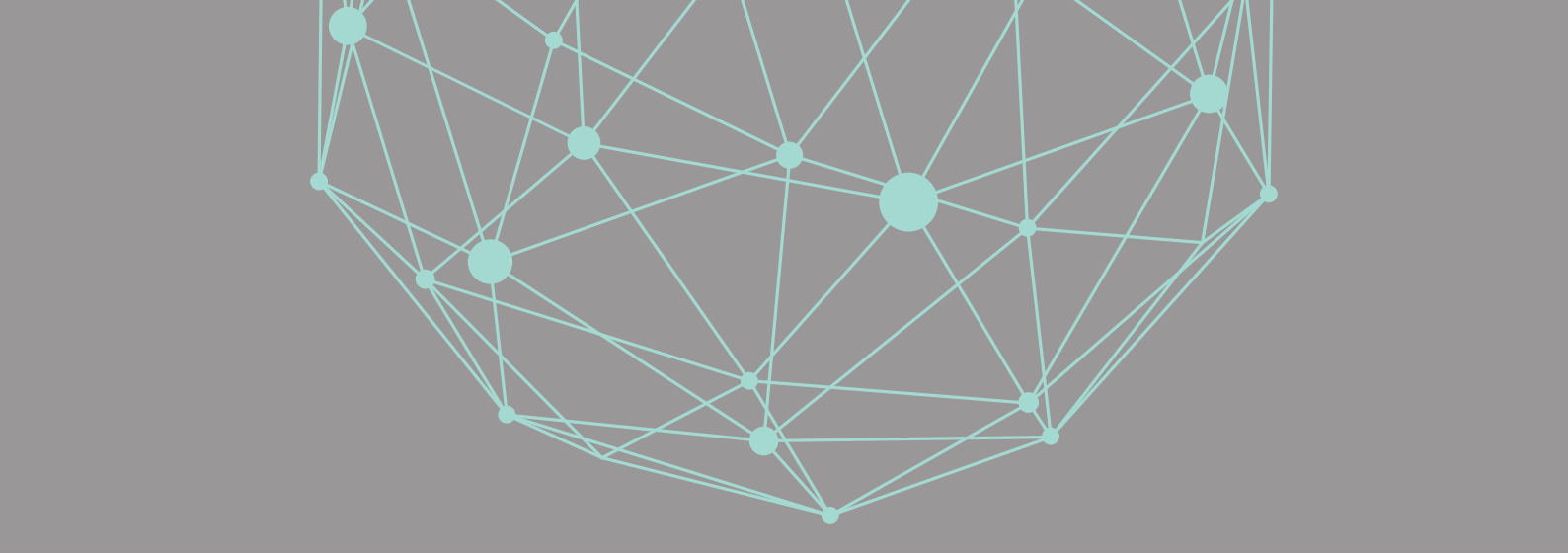
The Fraunhofer ISI employs different methods to deal with complex issues and thus offers its clients perspectives to solve problems

The current societal challenges such as the expansion of renewable energies or the sustainable use of raw materials while retaining high economic competitiveness increasingly require the interlinking of economic, ecological, technological and social issues. In order to find economically viable, technically feasible and socially acceptable solutions, decision-makers from politics and industry have to consider these highly complex interdependencies in their activities. This results in an increased need to identify and analyze such problems and provide sustainable solutions.

Societal challenges require a comprehensive mixture of methods to identify, analyze and solve problems and for a holistic evaluation.

The Fraunhofer ISI offers its clients proven method competence and wide-ranging knowledge and experience which have been accumulated over decades and whose interaction makes a holistic evaluation of complex questions possible. This is due to extreme flexibility and interdisciplinarity which also manifests itself in the fact that usually social scientists, economists, natural scientists and (industrial) engineers work together in the project teams to find solutions. The result is a sound method pool, which also includes qualitative instruments, for example expert interviews, workshops or literature analyses as well as quantitative primary surveys or secondary analyses. In addition to the sheer diversity of investigative methods, their combination and integration is one of the Fraunhofer ISI's particular strengths.

In addition, the Fraunhofer ISI has proven expertise in the area of modeling which can simulate complex socio-economic systems and make statements on macroeconomic or supranational developments. Climate and infrastructure policies, for example, cannot be considered separately with regard to issues such as future mobility. Rather, the development of long-term policy strategies requires an overall view in order to evaluate the macroeconomic or sectoral costs of measures facilitated by the ASTRA-model, which the Fraunhofer ISI developed. It shows, for example, the possible impact of growing economies on freight and passenger transport and the consequences for the environment.



However, the Fraunhofer ISI's holistic evaluation approach is not limited to macroeconomic questions but can also be applied on the company level. The Fraunhofer ISI accompanies and supports its industrial clients in evaluating and creating so-called new system solutions. Thus, the joint project "Balanced GPS", funded by the Federal Ministry of Education and Research (BMBF), developed together with three medium-sized "Hidden Champions" new solution approaches to implement lean production systems. On the one hand, the new solutions introduced economic improvements. On the other hand, the strong focus on employees realized major improvements of the working conditions for production staff. The economic improvements, for example by avoiding wastage or superfluous packaging, often accompanied significant ecological improvements.

Other study-related projects specifically use multiple-methods concepts which are directed at the complexity of the respective problem. A research project on the influence of nanotechnologies on solar energy and energy storage, for example, has identified different nanotechnology profiles on the basis of bibliographic analysis methods and visualized their future potentials in a meta roadmap. In order to examine the future potentials and strategies of traditional industries in Germany, on the one hand, official statistics (micro census, national accounts) as well as the Fraunhofer ISI's own "Manufacturing Survey" were analyzed. On the other hand, also patent and qualitative content analyses were used to paint a comprehensive picture of the macroeconomic significance, technological performance of different sectors and the innovation capability and competitiveness of local enterprises.

Multiple-methods concepts can capture the complexity of problems and make it possible to look at issues from different perspectives.

The value added of the holistic evaluation by the Fraunhofer ISI is that a comprehensive overall picture of the investigated questions is drawn as they are examined, revealed and analyzed from different perspectives. The capacity to bundle thematic, transdisciplinary and methodological professional expertise makes it possible for the Fraunhofer ISI to offer its clients a comprehensive problem analysis, as well as recommendations for action and solutions in-house and from a single source.

CORE COMPETENCES

The Fraunhofer ISI is characterized by five core competences. These consist of interlocking approaches and methods which are applied in its seven Competence Centers. These core competences form the basis for the range of services offered by the Fraunhofer ISI.

Understanding the innovation system
This core competence describes the ability to systematically identify and empirically-analytically document stakeholders, their interactions and the associated institutions with regard to the origins and safeguarding of innovations.

Identifying and evaluating complex problems with different scientific methods and approaches.

Empirical evidence
This core competence results from a well-founded knowledge of sectors, industries and technologies based on an extensive portfolio of data stocks and the use of qualitative and quantitative analyses.

Holistic evaluation
Linking different perspectives – regarding content, methods and processes – allows the Fraunhofer ISI to holistically evaluate technological, socio-economic, ecological and societal issues.

Designing futures
The Fraunhofer ISI derives design options and strategies for decision-makers from industry and politics by actively addressing possible and desirable future developments.

Policy analysis and design
The Fraunhofer ISI advises decision-makers from industry and politics using in-depth analyses and robust concepts and provides them with recommendations for how to act on issues relevant to innovation policy.


UNDERSTANDING THE
INNOVATION SYSTEM
POLICY ANALYSIS
AND DESIGN
DESIGNING
FUTURES
ISI
EMPIRICAL
EVIDENCE
HOLISTIC
EVALUATION

STAFF AND COMPETENCE CENTERS

INTERDISCIPLINARY COOPERATION FOR A SYSTEMIC PERSPECTIVE

171 members of staff from economics, natural science, engineering and social science backgrounds conduct research at the Fraunhofer ISI. Through their interdisciplinary cooperation, they are able to analyze even complex issues holistically – their systemic view integrates every perspective and guarantees clients from politics, the economy, academia and society a stable basis for decision-making.

Supported by 75 administrative staff, the researchers work on more than 380 projects each year to provide answers to socially-relevant questions. They apply a wide range of advanced scientific theories, models, methods and social scientific measurement tools in their research. They use the insights and findings from the research projects to continuously expand and develop the Fraunhofer ISI's portfolio.

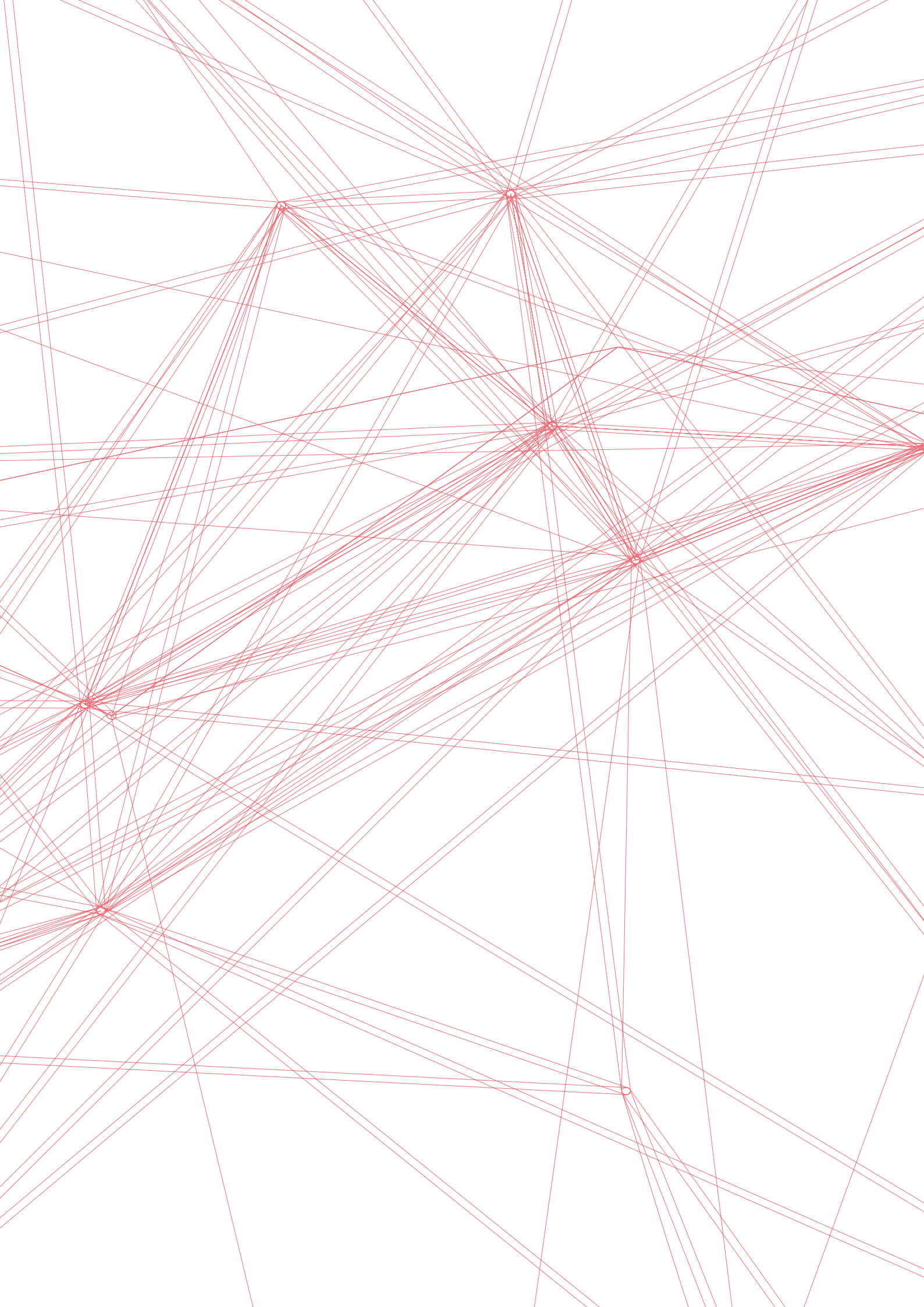
Alongside their work at the Fraunhofer ISI, many scientists also give lectures and seminars at universities and colleges, and present the latest research results at conferences. The results are also made available to the public in numerous publications.

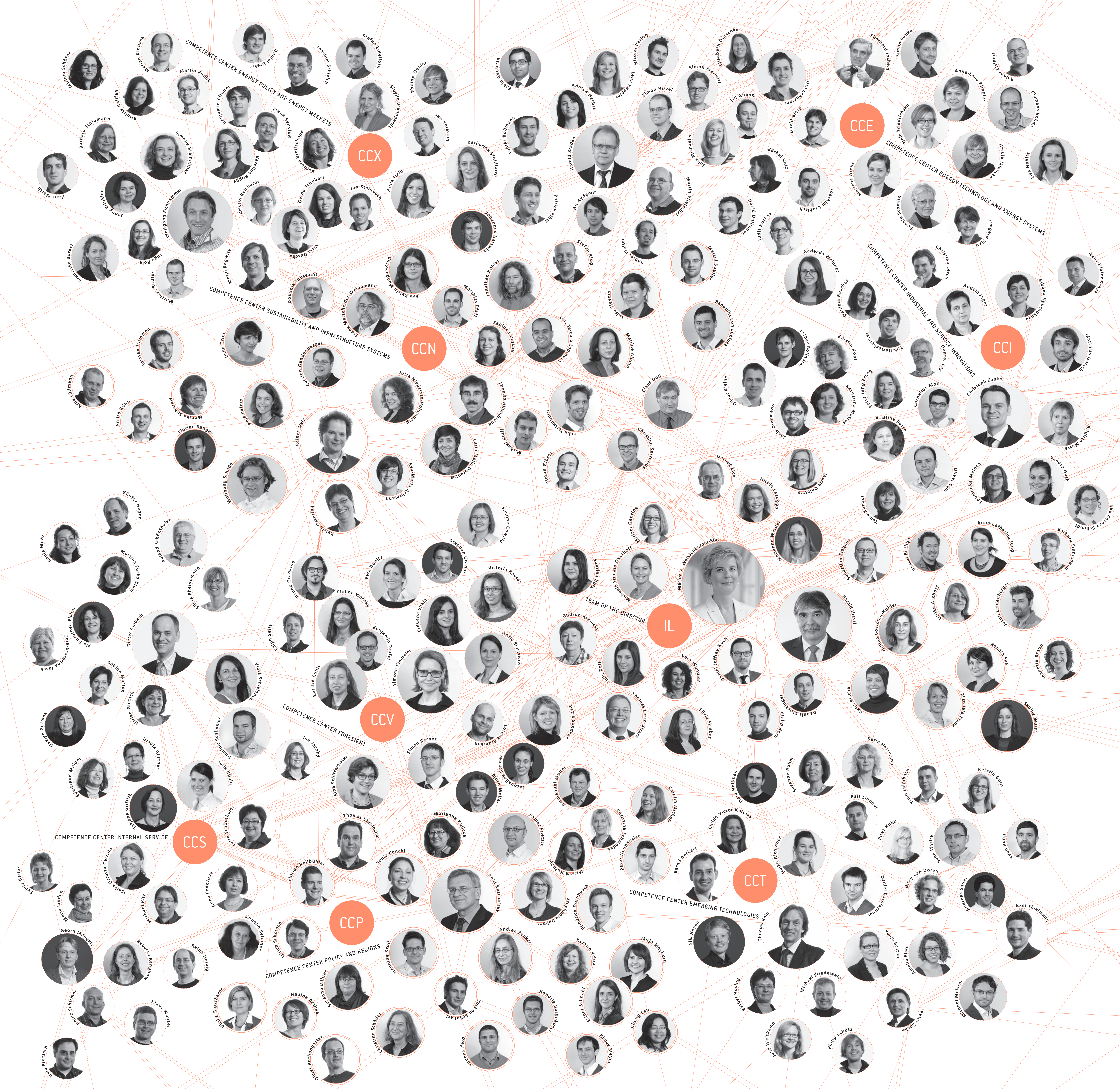
The staff at the Fraunhofer ISI work in seven Competence Centers with a total of 22 Business Units that cooperate closely.

- The CC Energy Policy and Energy Markets (CC X) investigates how the political and institutional framework for sustainable energy systems can be designed, further developed and evaluated.
- The CC Energy Technology and Energy Systems (CC E) analyzes innovative energy technologies and their contribution to a sustainable energy system from a strategic perspective.
- The CC Foresight (CC V) develops methods to identify and analyze long-term developments in society, the economy and technology.
- The CC Industrial and Service Innovations (CC I) researches how technical and organizational innovations help to safeguard Germany as a production location.
- The CC Sustainability and Infrastructure Systems (CC N) analyzes the prerequisites and possibilities to reduce emissions, improve resource efficiency and make infrastructure systems more sustainable.
- The CC Emerging Technologies (CC T) analyzes the potentials, impacts and design conditions of emerging technologies and develops policy options.
- The CC Policy and Regions (CC P) examines how research and innovation systems function and change.

The Fraunhofer ISI also has strong links to external networks. It is a Member of the Fraunhofer Group for Materials and Components – MATERIALS as well as the Group for Defense and Security VVS and is part of the Fraunhofer Alliances Batteries, Big Data, Energy, Nanotechnology, SysWasser and Transport.

The Fraunhofer ISI continues to strengthen its international orientation through cooperation with universities and research organizations in Europe, Asia and the US as well as in international networks and committees. One focus is China: The cooperation with the Institute of Policy and Management (IPM) Chinese Academy of Sciences (CAS) that has been in place since 2008 was intensified in May 2013 by setting up a "Joint Center for Innovation Research".





not in the photo: Daniel Popp, Irene Schickhardt (CCX); Edelgard Gruber, Wilhelm Mannsbart, Christian Morillas Vera, Volker Ott (CCE); Eva Wichmann (CCN); Annette Braun (CCI); Meike de Vries (CCV); Stephanie Christmann-Budian, Christine Mahler-Johnstone (IL); Gabriele Küchlin, Junying Fu (CCP); Renate Heger, Silke Just, Mickael Pero (CCT); Gudrun Göckel, Maria Kotalla, Gertrud Malcher, Monika Mühlberg, Valeria Schäffer, David Seith, Klaus Wiederstein (CCS)

STRATEGIC DEVELOPMENT OF ENERGY EFFICIENCY AND RENEWABLE ENERGIES

CC ENERGY POLICY AND ENERGY MARKETS

The energy transition is only possible if political and economic interests are brought in line. Making more use of renewable energies and improving energy efficiency are among the most important factors to meet energy needs in an environmentally-friendly and sustainable manner, secure supplies and protect the environment. The scientists of the Competence Center Energy Policy and Energy Markets design and evaluate energy and climate policy measures and instruments as well as strategies for research and development so that a sustainable energy system can develop quicker. Their research helps decision-makers to formulate policy instruments. They also advise enterprises when introducing technological, economic and institutional reforms.

Expanding the use of renewable energies and improving energy efficiency are important factors for the energy transition to succeed.

The Business Units *Renewable Energies* and *Energy and Climate Policy* focused their research on the EU targets for 2020 and 2030 to reduce greenhouse emissions and energy demand in the future. A consortium, which included the Fraunhofer ISI, established in the project "Beyond 2020 – Design and impact of a harmonized policy for renewable electricity in Europe" that a climate target on its own is not sufficient to realize additional energy savings and ensure the continuous further development of renewable energies. Therefore, binding targets for energy efficiency and the use of renewable energies should be underpinned by a possible Europe-wide climate target for the year 2030. The project "Analysis of a European Reference Target System for 2030" investigated how a 2030 target system for Europe based on economic energy efficiency potentials could be structured. When implemented, these potentials, combined with ambitious policies for renewable energies, can significantly reduce greenhouse emissions by more than 50 percent compared to 1990. Thus, the objective of an (at least) 80 percent reduction until 2050 can be adhered to. Furthermore, new technologies are needed to attain the long-term climate targets until 2050. However, these have to be developed and brought onto the market

today so they are available when they are needed. It is also necessary to further develop the key instrument of emission trading whose impact the Competence Center investigated in the project "Evaluation and Further Development of EU Emission Trading" in order to strengthen its capacity to trigger low emission innovative technologies.

On a national level, the German Renewable Energies Act (EEG) is crucial for implementing the energy transition. The project "Thinktank future Renewable Energy Act" designed and investigated the possibilities of developing the Renewable Energies Act further. The project shows that when determining the remuneration for renewable energies, competitive elements are going to play an increasingly important role. Regarding the type of remuneration, production-based market premiums are suitable for large-scale facilities to combine a low risk for investors with the required needs-based feed-in. For small-scale facilities, the most suitable method is still fixed remuneration. In case a broader portfolio of technologies should continue to be supported, a technology-specific design of the instruments is necessary in order to limit free-rider effects. Regarding the choice of a cost or quantity cap, the study explains that a quantity cap is easier to implement, however, a regular adjustment depending on the cost development is necessary. A cost cap, on the other hand, makes it possible to directly address limiting the funding costs without directly limiting the expansion of renewable electricity generation.

Competitive elements are going to play an increasingly important role in the necessary further development of the German Renewable Energies Act.

In the project "Direct marketing of electricity from renewable energies", the Business Unit *Electricity Markets and Infrastructures* evaluates the market premium and flexibility premium which were introduced within the framework of the amendment of the Renewable Energies Act in 2010. These instruments are intended to strengthen the direct marketing of renewable energies and consequently make the feed-in from renewable energy sources more flexible in order to efficiently integrate a high proportion of renewable energies into the electricity grid. In this project, the scientists investigate the impact of the instruments and identify possible barriers while integrating aspects regarding energy efficiency and legal aspects. Based on these findings, they devise recommendations for further developing ways of direct marketing and removing possible legal barriers. The ultimate objective of the project is the greater integration of renewable energies into the electricity markets.

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CREATING THE FRAMEWORK FOR GERMANY'S "ENERGIEWENDE" WITH TECHNOLOGIES FOR GREATER ENERGY EFFICIENCY

CC ENERGY TECHNOLOGY AND ENERGY SYSTEMS

German industry currently emits around 350 million tonnes of CO_2, including the indirect emissions from electricity generation. There is a huge potential here to reduce emissions by using energy more efficiently and substituting the energy sources currently used. The Competence Center Energy Technology and Energy Systems analyzes innovative energy technologies and the contribution they can make to a sustainable energy system from a strategic perspective. The researchers develop concepts for the introduction of new technologies and monitor them scientifically.

Learning networks of companies can double their energy efficiency compared to the industrial average.

One work focus is energy efficiency in industry because there is huge economic potential in German enterprises for more climate protection and greater energy efficiency. Substantial energy costs can be saved with currently profitable technologies; this strengthens competitiveness and reduces greenhouse gas emissions. Sponsored by the German Federal Ministry for the Environment (BMU), the "30 Pilot Networks" project brings 10 to 15 companies together in a learning network to promote climate protection and energy efficiency. It has been shown that these companies can double their energy efficiency compared to the industrial average. The researchers in the Business Unit *Energy Efficiency* are monitoring the project and working on technologies and measures to improve energy efficiency.

Another research focus is assessing the costs and benefits of efficiency technologies as well as identifying indicators of efficient energy use both in a corporate and a national context. For instance, the Fraunhofer ISI was commissioned to do a preliminary study on the energy efficiency of industrial steam generators as part of the European Union's ecodesign process because ecodesign – in other words, replacing inefficient appliances with those that have lower energy

consumption – not only takes place in households, but also in industry. The study assessed the technical, economic and ecological impacts of industrial steam generators considering their entire life cycle from production to disposal. The insights gained from the preliminary study enable minimum standards to be drafted and the products improved as a result.

Future energy demand is not only an important lever for Germany's "Energiewende" – the successful transformation of the energy sector – as decided by the German government, and for the development of costs, but also provides the basis for planning investments in the energy sector. With the help of energy models, the Business Unit *Demand Analysis and Projections* examines how future energy demand could develop depending on different boundary conditions and influencing factors like energy prices, new technologies and energy policy instruments. The German Federal Ministry for the Environment commissioned the Fraunhofer ISI and the German Öko-Institut to construct scenarios with different levels of ambition with regard to climate policy for the time horizon up to 2050. These analyze the measures and strategies needed to achieve the German government's climate goal of reducing greenhouse gases by 80 to 95 percent by 2050 as well as the associated costs and benefits. The bottom-up models FORECAST and INVERT used to plot the energy demand and CO_2 emissions in industry, services and buildings up to 2050 show considerable efficiency potentials in motor systems and low-temperature heat. Without significant final energy savings in buildings, however, the climate targets will not be met.

Scenarios and energy models make it possible to predict future energy demand and analyze the measures and strategies needed to achieve climate targets.

Besides climate targets, the German government has also set targets for energy consumption. A 10 percent reduction is planned until 2020 and 25 percent until 2050. The simulation calculations made show that the power consumption of traditional electricity consumers does decline significantly, but that if additional new consumers like electric cars or heat pumps are included, the 25 percent saving target will not be able to be met according to the study.

Issues surrounding Germany's "Energiewende" are also being addressed in several studies for industry and policy-makers in the Business Unit *Energy Economy*. The main focus here is on assessing innovative energy technologies and analyzing the acceptance of those affected and the general public which is playing an ever more important role in Germany's "Energiewende".

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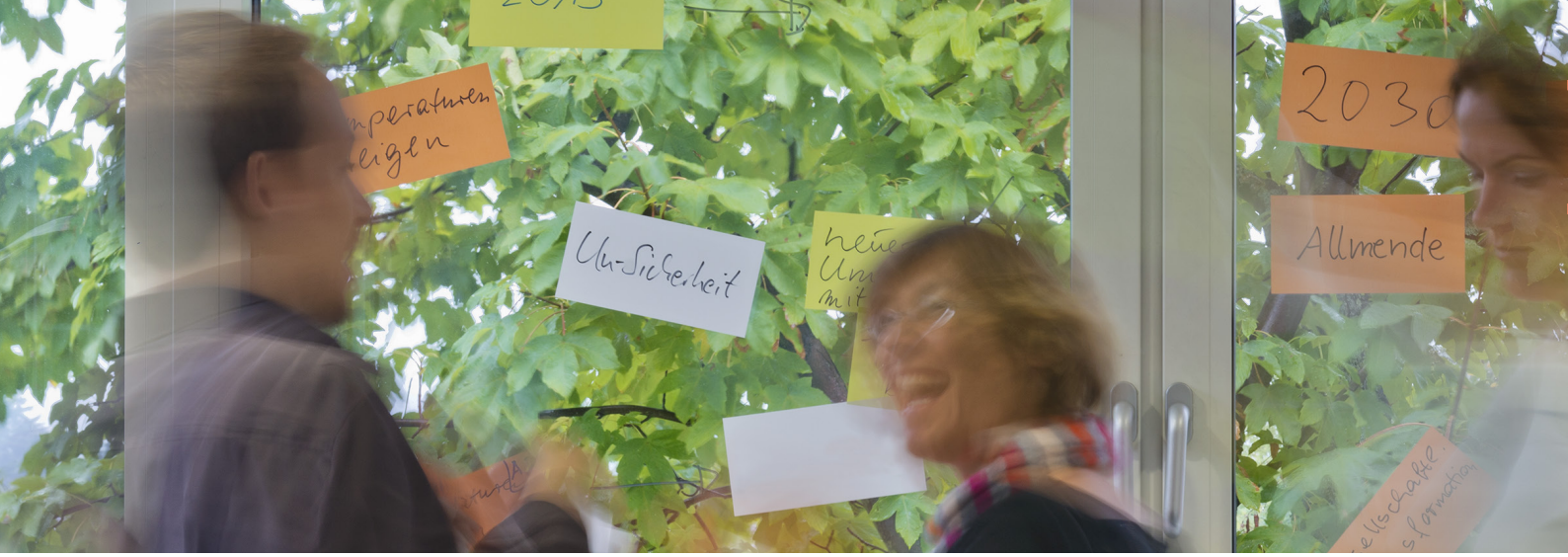

FORESIGHTED STRATEGY ADVICE FOR DECISION-MAKERS FROM INDUSTRY AND POLITICS

CC FORESIGHT

Strategic decisions are made on the basis of future expectations and visions. The Competence Center Foresight supports enterprises and political actors in the active analysis of possible and desired future developments and in deriving robust blueprints for the future. The Competence Center Foresight thus strengthens the decision-making ability and resilience of clients from industry, politics, science and society.

The qualitative and quantitative sound blueprints for the future are characterized by a methodologically transparent approach, understandable documentation and visualization of impacts as well as plausibility and consistency checks. The Competence Center offers the following modules in the area of foresight:

- Early recognition of trends, themes, opportunities and risks with the aid of scanning, scouting, bibliometry and patent analyses
- Multicriteria assessment of technologies
- Delphi surveys and expert interviews
- Scenario development
- Development of blueprints and guiding models
- Roadmaps for technology, products and industries to structure and visualize activities and entrepreneurial and political options for action
- Discourse processes which involve stakeholders, experts and citizens (e.g. scenario and creative workshops, world cafés, futures laboratories)
- Planning and implementation of long-term national, regional and issue-specific foresight processes

The basis for quantitative and qualitative sound blueprints for the future for enterprises and political actors comprises a mixture of methods of different evaluation and survey tools, scenarios and roadmaps.

Important clients in industry are medium-sized companies as well as large businesses and industry associations. Foresight processes give clients from politics decision-making tools and orientation for future societal trends and demands so they can focus their technology and innovation policies in the future. Clients from industry and their associations receive information about possible future markets, products and demands and develop resilient thought patterns and specific foresight processes through interaction.

The Business Unit *Future Alternatives and Society* researches possible futures for society – from searching societal trends to cultural fundamental questions such as the future relationship between man and technology. The focus is on analyzing and evaluating future interactions between different social sub-areas (civil society, industry, politics technology, environment etc.) socio-technical innovations, transformation processes as well as the stability and dynamics of social phenomena. On this basis, the experts develop future scenarios and provide the stimulus for discussing new topics.

Alternative perspectives, scope for action and options for action for stakeholders and their decision processes are developed in futures workshops.

Developing future scenarios for enterprises, citizens or politics is the focus of the Business Unit *Futures Thinking and Dialogs*. Based on the analysis of future expectations, structures and framework conditions, the team develops and accompanies dialog processes and futures workshops. Together with the stakeholders, possible and alternative futures are outlined and assessed. Thus, different perspectives are integrated, scope for action shown and options for action opened up. Depending on the demand and requirements, the scenario or visioning processes are structured in a participative, normative or transformative manner. To this end, the scientists continually develop and test new methods and combinations of methods to shape futures blueprints and dialogs and also introduce issue-specific competence into the process e.g. in the area of security or materials science.

The Business Unit *Foresight and Strategy Development* supports decision processes by developing and conducting foresight-based strategy processes for clients from industry, politics and science. With the help of roadmaps and scenarios, it develops together with clients medium- to long-term overall strategies, analyzes trends and market potentials and reveals options for action.

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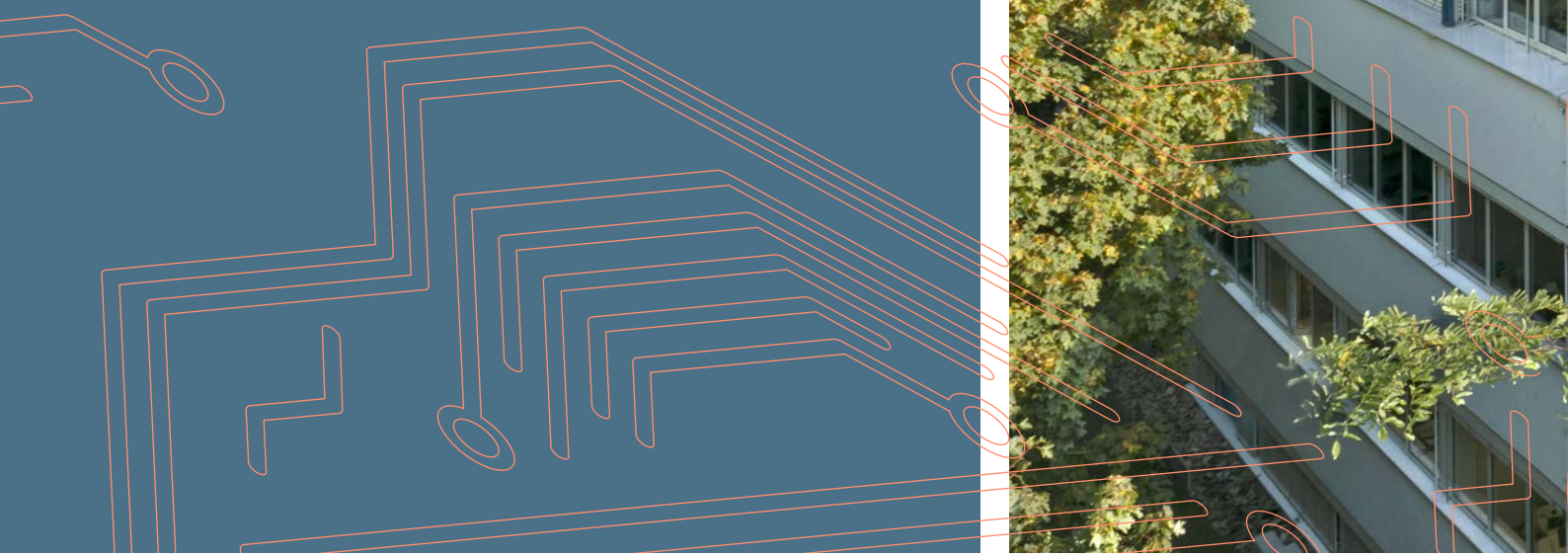

INCREASING INDUSTRIAL VALUE ADDED WITH SUSTAINABLE SOLUTIONS

CC INDUSTRIAL AND SERVICE INNOVATIONS

The Competence Center Industrial and Service Innovations analyzes and evaluates how to use innovations to design industrial value added processes in a way that safeguards and develops industrial production in Germany and Europe in the long term, not just economically in terms of global competition, but also ecologically and socially. Innovation is regarded as an integral part of every phase of industrial value added. Individual companies, their internal processes and external networks are the main starting point for the range of research offered in the Competence Center. Based on this integrated understanding of innovation, the Fraunhofer ISI develops sustainable solutions and strategies with the potential for high value added for companies, value networks and entire industries on the basis of advanced business management and socio-economic analyses.

The research fields of the Competence Center include the diffusion and impacts of technical and organizational process innovations, the design of local and global innovation and value chains, the management and development of industrial services and service-based business models as well as the assessment and design of innovation, technology and economic policy measures. The Competence Center has at its disposal an exclusive and internationally recognized set of primary data at company level in the European Manufacturing Survey (EMS), which serves as the foundation for comprehensive analyses at the level of individual companies or sectors.

The exclusive data set European Manufacturing Survey forms the basis for numerous analyses of process innovations and innovative business models in production.

The Business Unit *Innovative Production Systems and Value Chains* worked together with the German firms Schroff GmbH, KAVO Dental GmbH and FLEX-Elektrowerkzeuge GmbH in the "Balanced GPS" project to develop approaches towards integrated production systems in production environments that require a high degree of flexibility. The Competence Center provided

scientific support, accompanied the companies' transformation process for three years from the old production set-up to a stable but flexible lean production environment and validated the new approaches and methods during this period. The solutions aim at strategy-oriented planning of integrated production systems, on the one hand, and at designing the changes in the companies' organization and procedures, on the other.

Hybrid business models – which combine products and services – can be promising strategies and provide competitive advantages for industrial companies. The Business Unit *Industrial Services* has extensive skills in this field. For instance, in the "DEMAT" project, innovative machine tool concepts and new kinds of manufacturing processes were developed which use natural resources more sparingly, reduce the pollutant emissions associated with industrial production and lower the safety risks when manufacturing and using machine-made products. The Competence Center's focus was on developing a new kind of business model that offers guarantees of future capacity adjustments under pre-agreed terms in addition to just selling products. The project was carried out together with the Italian research partner ITIA-CNR and European practice partners from the machine tool industry.

Hybrid business models as innovative production concepts open up new, more efficient manufacturing processes that give companies a competitive edge over their rivals.

The Key Enabling Technologies (KETs) are six fields of technology accorded high future potential by the European Commission. One third of EU research funds are earmarked for production technologies, materials research, industrial biotechnology, nanotechnology, nanoelectronics, microelectronics and photonics. Past experience has shown that even very promising technologies may not make it through the so-called "valley of death" on route to commercialization. Together with the Competence Center Emerging Technologies and various European partners, the Business Unit *Industrial Innovation Strategies and Systems* analyzes which hurdles technologies have to overcome on their way from the lab to the concrete industrial application. A critical station has already been identified with pilot productions. A large-scale international comparative analysis and a detailed in-depth study should reveal the relevant boundary conditions so that KETs can find their way into products and services. The results lead to recommendations for policy-makers on how to improve these boundary conditions. Another joint study looks at the conditions of technology commercialization from the perspective of selected user industries. The focus here is on matching technology trends with user trends. So-called consolidated roadmaps will be compiled that illustrate the matches.

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SUSTAINABLE DEVELOPMENT ON EVERY LEVEL

CC SUSTAINABILITY AND INFRASTRUCTURE SYSTEMS

The shortage of resources and diverse pollutant emissions make it very clear that natural resources must be used sustainably and environmental pollution avoided. The process of globalization and a growing pressure in newly industrializing and developing countries to act mean the requirements of sustainable development are becoming ever more important from an international viewpoint. An essential prerequisite for this is the accelerated diffusion of environmentally-friendly and socially-acceptable innovations. The research conducted in the Competence Center Sustainability and Infrastructure Systems expands the knowledge about the necessary innovation processes so that policy-makers and companies can make decisions that promote sustainability. To do so, the researchers investigate the ecological, economic, political and social aspects of sustainable developments and design solutions for efficient resource use.

The path to a sustainable water sector is a primary topic of the Business Unit *Water Resources Management*. Researchers are currently identifying starting points to reduce emissions in the project "Effectiveness and cost efficiency of product-based and end-of-pipe measures to reduce the emission of micropollutants to water" and are assessing them with regard to their political and technical feasibility as well as their possible secondary effects. In addition, within the scope of implementing the EU's Marine Strategy Framework Directive, pollutants are being described and prioritized using different criteria – as the basis for defining future standards and monitoring programs. The challenges resulting from climate change, demographic changes and pollution problems also require a greater shift in the direction of new water infrastructure concepts. In the model projects "Innovative water infrastructure concepts for housing" and "Centralized operation of decentralized systems", innovative approaches like advanced wastewater treatment with integrated heat recovery and the centralized operation of decentralized small sewage plants are being realized and assessed with regard to their impacts, transferability and the need for further research.

Conventional water infrastructure systems are facing new challenges due to climate and demographic change that make innovative concepts necessary for housing developments and decentralized systems.

Transport policy measures and strategies in the field of mobility that contribute to modernizing transport infrastructure, vehicle fleets and protecting the climate are topics in the Business Unit *Transportation Systems*. Important future options at national, EU and global levels are integrated mobility concepts which are assessed from a systemic viewpoint. Analyses in the field of car-sharing in the REM 2030 project reveal the considerable economic potential of more differentiated business models that are capable of exploiting this market segment. The Business Unit is developing a vision of an integrated rail system in 2050 for the EU Commission in the "LivingRAIL" project. New mobility strategies and the associated policies have major impacts on the economy as a whole. To analyze the impacts, a modeling instrument is being developed in the "Assist" project, which will be applied by the EU Commission to integrated policy analysis and policy design in the transport sector.

Research in the Business Unit *Systemic Risks* focuses on understanding and reducing the risks faced by the systems supplying non-energy raw materials, electricity, water and mobility. The scientists describe the affected systems, examine the impacts of changing boundary conditions and identify and assess the possible options for clients from industry and policy-makers. Key risks are those threatening the supply of raw materials: together with British partners, the European list of critical raw materials was updated for the EU's Directorate General Enterprise and Industry. Dynamic material flow modeling is being further developed in a group of projects for the International Copper Association. This plots the whereabouts of raw materials in the macroeconomic system. This method is also being used to help forecast future shortages in other projects (for example "Value from Waste" and "INTRA r^3").

The list of critical raw materials describes possible future supply risks, allows material flow modeling to be adapted to the new boundary conditions and indicates alternative options for industry and politics.

Resource efficiency is an interministerial policy goal in Germany. The Business Unit *Sustainability Innovation and Policy* researches the most suitable instruments to achieve this as well as interfaces and complementarities with the German raw material strategy, among others, in the project "Policy recommendations raw materials" for the German Federal Environment Agency. To assess the sustainability of resource efficiency innovations and strategies, the methodological tools in the r^2 Integration and Transfer Project have been refined and used to quantify the impacts of the innovations on raw material productivity and on the reverse tendencies to save materials (rebound effect). Another focus of the work on sustainability innovations is how the environmental benefits of new technologies can be reliably estimated despite their early phase of development.

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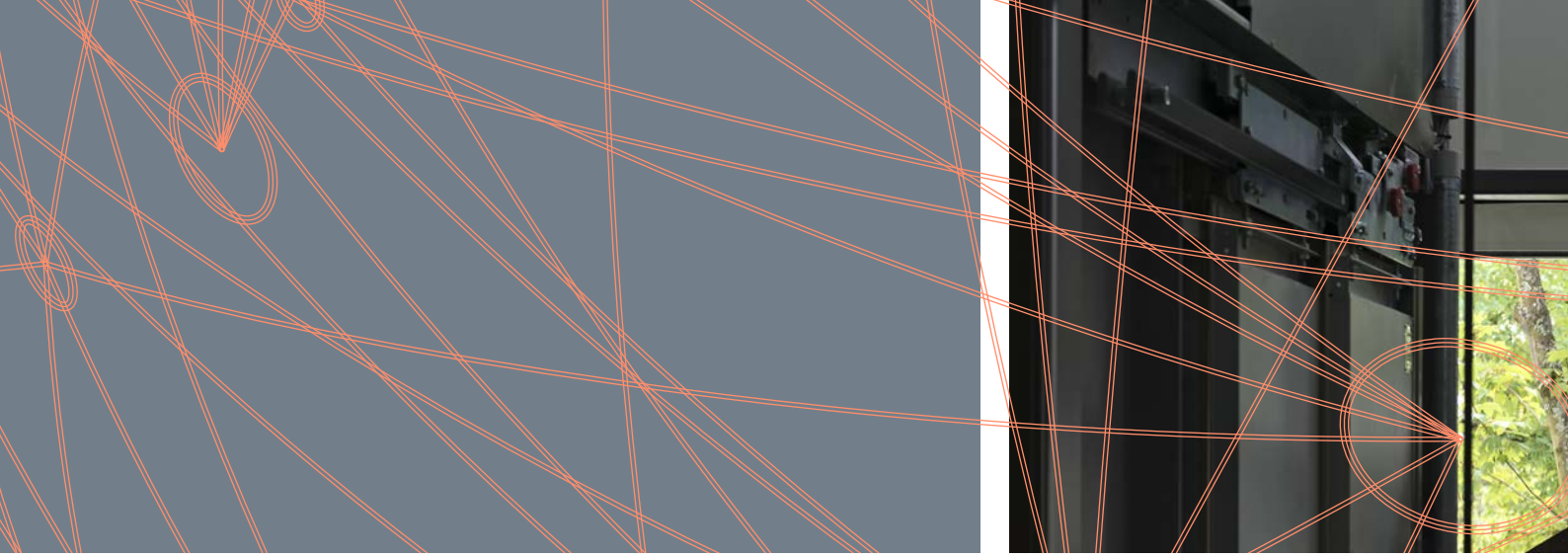

FOCUS ON EMERGING TECHNOLOGIES

CC EMERGING TECHNOLOGIES

New technologies can make complex production processes more efficient, control energy and transportation systems in an intelligent way and improve the quality of healthcare. In addition, combining high-tech fields in a specific way can be key to the successful development of entire economies. Research in the Competence Center Emerging Technologies focuses on biotechnology, information and communication technologies, health technologies and nanotechnology as well as new interdisciplinary approaches resulting from the interactions of these technologies.

The Business Unit *Biotechnology and Life Sciences* analyzes the potentials and challenges of technologies at different stages of innovation. Cell-free biology is one example for a technology in the middle phase of innovation. This involves producing proteins without using intact cells, which could make production processes much more efficient. The technology is already established on a laboratory scale today, but is not yet being used on an industrial scale. To address this, the Fraunhofer project "Cell-free bio-production" was launched as part of the German Federal Ministry of Education and Research's (BMBF) long-term strategy process "Biotechnology 2020+". The Business Unit is contributing to this project's success through a variety of innovation-supporting measures.

The data-based analyses and control of processes known as Big Data create new applications and new knowledge. These have to be identified and investigated but also questioned.

The Business Unit *Information and Communication Technologies* deals with IT-based innovations and their implications for the economy and society. We are currently working on several projects in the context of Big Data. This concerns new possibilities of data-based analysis and control, for instance of intelligent energy systems (smart grids), intelligent transport systems (eMobility) or in trade and commerce (personalized marketing). The projects identify useful big data applications and examine potential new knowledge gains, but also ask critical questions about data protection and privacy.

Due to the many European and national projects which have been carried out in the last few years on the topics of Internet data protection, privacy and security, e.g. the EU project "PRISMS: Privacy and Security Mirrors" or "Panel for privacy and independence in the digital world" on behalf of the BMBF, the Business Unit has accumulated expertise which is currently in high demand in light of current events.

The Business Unit *Innovations in the Health System* examines the impacts of technical and process-related advances in healthcare. On a micro level, we analyze specific inventions and their potentials. On a macro level, we look at the entire "healthcare" innovation system, for example, in the following two studies, which have received a lot of attention over the past year:

For the Office of Technology Assessment at the German Bundestag (TAB), the Business Unit investigated why healthcare innovations frequently do not result in cost savings as is the case in the IT domain, for instance. The project concluded that it is often not possible to provide clear evidence of the cost-benefit ratio of innovations in healthcare because of a lack of reliable, neutral studies. In the project "Analyzing healthcare from an innovation system perspective", which was based on a detailed systemic analysis, eight hypotheses were formulated on modernizing the German healthcare system and concrete proposals were made for how to overcome innovation blockades. These include promoting a culture of dialog, for instance, improving knowledge management, or designing an interministerial health system strategy.

In a series of projects within the thematic field of Nanotechnology, we research how key technologies develop from combining new technology fields, what the suitable support measures are, and which concrete requirements result for commercialization. These projects deal with the so-called Key Enabling Technologies (KETs). In the "Multi-KETs" project, we are analyzing the institutional fit of policy programs and industry activities and examining commercial utilization, for example, in two pilot schemes. And in the "NMP Evaluation" project, we are assessing the impacts of the corresponding EU program using an extensive set of indicators. Both projects are intended to help align the EU Commission's future KET activities to the specific requirements of new types of technology combinations and thus to design tailor-made support measures.

Nanotechnology as a key technology opens up many possibilities, for commercialization as well. These have to be identified in order to design the relevant support measures and catalog of requirements.

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STRATEGIC KNOWLEDGE FOR INNOVATIVE RESEARCH POLICIES

CC POLICY AND REGIONS

The Competence Center Policy and Regions investigates the competitiveness of research and innovation systems on the supranational, national and regional level. The investigations aim to analyze the way innovation systems work and how they change as well as to derive conclusions about the way structures and developments can be shaped politically. This way political decision processes can be designed more systematically and decisions justified more rationally. Actors and strategies which produce knowledge and innovations in industry and science are analyzed, and instruments are designed and evaluated which are used by the state to support innovations.

The Business Unit *Policy and Evaluation* evaluates primarily innovation policy measures and programs and conducts policy analyses in the fields of research, technology and innovation policy. The focus is on the analysis of the contexts and conditions for successful innovations and the policy design initiatives taken by political institutions and actors. The activities in the year 2013 included the improved design of knowledge and technology transfer (accompanying evaluation of the support measure "Validating the Innovation Potential of Scientific Research – VIP"), the investigation of the framework conditions for start-ups (scientific support for the support measure "EXIST – Start-ups from Science") and the "Evaluation of the SIGNO program – Protection of Ideas for Commercial Use", sponsored by the German Federal Ministry of Economics and Technology.

The analysis of conditions for the success of innovations and political design initiatives improves knowledge and technology transfer.

The Business Unit also closely investigated the future of the German university system and the European research area. Studies addressed issues at both the macro level, for example a project on the challenges of globalization, and at the micro level, for example an analysis of the decision-making behavior by individual scientists in regard to a stay abroad and the conclusions which have to be drawn for the political program planning (impact analysis of the Austrian Erwin-Schrödinger-Program).

The Business Unit *Regions and Clusters* analyzes and evaluates innovation- and technology-related potentials and processes in regions and functional spaces. The focus is on scientifically sound analyses of the structure and dynamics of regional innovation systems and technology clusters and the evaluation of regional support programs and initiatives of innovation and structural policies. This included an analysis of the current situation of biotechnology in Bavaria for the Bavarian Ministry for Economic Affairs. It shows that, in the field of red biotechnology, Bavaria is thematically and structurally well positioned, whereas there is still potential to expand the field of white biotechnology. The question of how companies protect their innovation capability in the context of globalizing markets was investigated for the Chamber of Commerce in Karlsruhe. It became clear that the surveyed companies are often drivers of globalization themselves and their strategies and the measures they take vary greatly depending on the industry, technology field and company size.

The Business Unit *Innovation Indicators* primarily uses quantitative data and economic and socio-scientific methods to assess the competitiveness of innovation systems. As part of the reporting process by the Expert Commission Research and Innovation (EFI), the patenting behavior of companies during the economic crisis 2008 and 2009 was investigated. It was revealed that, during the crisis, the number of patent registrations was decoupled from the research and development (R&D) costs. Companies were able to keep the cost for internal R&D high while the external R&D costs such as projects with other companies and scientific institutions were reduced. Costs were also saved in the patent system itself by scrutinizing the companies' own patent portfolios. Registrations were more selective and the average patent family size – i.e. the number of countries in which the same technology was registered for protection – declined slightly.

The economic crisis of 2008/2009 resulted in decoupling patent registrations and internal and external R&D costs.

A project for the EU Commission investigated the long-term influence of the exchange program "Marie Curie" on the careers of the sponsored scientists. It turns out that the scholarship holders are above average in all areas in their respective departments. They publish more, more often together with international partners, and, on average, also with higher scientific quality.

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ANNEX

ACADEMIC TEACHING

ACADEMIC TEACHING

Simon Berner
LECTURE
Lebensmitteltechnologie
University of Würzburg

Harald Bradke
LECTURE
Energiewirtschaftliche Aspekte der Energietechnik I
University of Kassel

SEMINAR
Energiewirtschaftliche Aspekte der Energietechnik II
University of Kassel

Tanja Bratan
LECTURE
E-Health
Furtwangen University

Barbara Breitschopf
LECTURE
Socio-economic aspects of development planning
Karlsruhe Institute of Technology

Janis Diekmann
LECTURE
Qualitative Research Methods
EBS Universität für Wirtschaft und Recht Oestrich-Winkel

Ewa Dönitz
BLOCK SEMINAR
Innovationswerkstatt: Innovations- und Projektmanagement
Femtec Berlin

Cheng Fan
TUTORIAL
VWL I
Karlsruhe University of Applied Sciences

LECTURE
Chinesische Sprache, Kultur und Geschichte
DHBW Mannheim

Nils Heyen
SEMINAR
Werkstatt Abschlussarbeiten
Karlsruhe Institute of Technology

Thomas Hillenbrand
LECTURE
Socio-economic aspects of development planning
Karlsruhe Institute of Technology

Eberhard Jochem
LECTURE CONTRIBUTION
Environmental impacts of energy conversion and use
ETH Zurich, Switzerland

Simone Kimpeler
LECTURE
Gesundheit, Sicherheit, Gesellschaft. Einführung in die Soziologie
Furtwangen University

Daniel Jeffrey Koch
SEMINAR
Roadmapping
Karlsruhe Institute of Technology

SEMINAR
Technologien für das Innovationsmanagement
Karlsruhe Institute of Technology

LECTURE and SEMINAR
Unternehmensnetzwerke
University of Kassel

Knut Koschatzky
SEMINAR
Das deutsche Innovationssystem – theoretische Grundlagen, empirische Beispiele und politische Gestaltung
Leibniz Universität Hannover

SEMINAR
Merkmale und Entwicklungstendenzen der europäischen Regional- und Innovationspolitik
Leibniz Universität Hannover

SEMINAR
Kooperation zwischen Wissenschaft und Wirtschaft – Modelle, Förderansätze und regionale Perspektiven
Leibniz Universität Hannover

Henning Kroll
IN-DEPTH MODULE III
Innovation und Transfer
German University of Administrative Sciences Speyer

Ralf Lindner
LECTURE
Akteure der Interessenvertretung und Parteien
Quadriga University of Applied Sciences Berlin

SEMINAR
Medien und Medienwirkung im politischen Prozess
Quadriga University of Applied Sciences Berlin

Emmanuel Muller
SEMINAR
[CID]: Créativité, Innovation et Décision
University of Strasbourg, France

Peter Neuhäusler
TUTORIAL
Management neuer Technologien – Technikbewertung mit Patentanalysen
Karlsruhe Institute of Technology

Anja Peters
SEMINAR
Umweltpsychologie
University of Basel, Switzerland

Patrick Plötz
SEMINAR
Elektromobilität – Konzepte, Treiber und Potenziale
Karlsruhe Institute of Technology

Mario Ragwitz
LECTURE
Erneuerbare Energien in Europa
University of Freiburg

Thomas Reiß
LECTURE
Management neuer Technologien
Karlsruhe Institute of Technology

Karoline Rogge
LECTURE
Introduction to Ecological Economics
ETH Zurich, Switzerland

Clemens Rohde
LECTURE
Energieeffizienz
Technische Universität Darmstadt

PROJECT SEMINAR
Energie- und Ressourcenmanagement
Technische Universität Darmstadt

LECTURE
Energieeffizienz
Technische Universität Darmstadt

LECTURE
Planung, Bau und Betrieb von Abfallbehandlungsanlagen
Technische Universität Darmstadt

Joachim Schleich
LECTURE
Energy Marketing and Strategy
Grenoble Ecole de Management, France

LECTURE
Managerial Economics
Grenoble Ecole de Management, France

LECTURE
Business Statistics
Grenoble Ecole de Management, France

Torben Schubert
SEMINAR
New Public Management
German University of Administrative Sciences Speyer

GRADUATE SUMMER SCHOOL
Applied Econometrics
Universität Marburg

Oliver Som
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Qualitative Research Methods
EBS Universität für Wirtschaft und Recht Oestrich-Winkel

LECTURE
Organizations in Complex Environments
Furtwangen University

LECTURE
Managing Innovation Creativity
Furtwangen University

Rainer Walz
LECTURE
Umwelt- und Ressourcenpolitik
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LECTURE
Umweltökonomik und Nachhaltigkeit
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Marion A. Weissenberger-Eibl
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Technologischer Wandel in der Energiewirtschaft
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Volkswirtschaftslehre
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LECTURE
Arbeitsmarkt und Soziale Sicherung
International University of Cooperative Education Darmstadt

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DISSERTATIONS

Marlene Arens
Analysis of future technological developments in the iron and steel industry against the background of energy efficiency and climate change
Prof. Ernst Worrell
Utrecht University, The Netherlands

Tobias Boßmann
Analyse der Verschiebungen in der Stromlastganglinie und der Auswirkungen auf den Kraftwerkspark
Prof. Martin Wietschel
Karlsruhe Institute of Technology

Daniela Buschak
Dienstleistungsbasierte Geschäftsmodelle im Verarbeitenden Gewerbe – Theoretische Herleitung der Mehrwerte dienstleistungsbasierter Geschäftsmodelle und Überprüfung deren praktischer Realisierbarkeit am Beispiel Maschinenbau
Prof. Kai-Ingo Voigt
Universität Erlangen-Nürnberg

Meike de Vries
Roadmappinggestützte Innovationskommunikation
Prof. Martin G. Möhrle
University of Bremen

Friedrich Dornbusch
Determinants of Academics' Engagement in the Region and in University–Industry Interactions – New evidence based on survey and patent data
Prof. Thomas Brenner
Universität Marburg

Till Gnann
Interaktion der Marktdiffusion von alternativen Antrieben und der Verbreitung ihrer Infrastruktur
Prof. Martin Wietschel
Karlsruhe Institute of Technology

Kerstin Goos
Bürgerbeteiligung an Forschungs- und Innovationspolitik
Prof. Ulrich Dolata
University of Stuttgart

Bruno Gransche
Zukunft im Unfall – Ein philosophischer Beitrag zum Umgang mit neuen Akzidenzphänomenen
Prof. Martin Gessmann
Heidelberg University

Dara Hallinan
The Body as a Source of Data: Studying the legal significance of new forms of data created by emerging technologies in the context of European Data Protection Legislation
Prof. Paul De Hert
Universiteit Brussel, Belgium

Andrea Herbst
Kopplung eines makroökonomischen Modells mit technologiespezifischen Energiemodellen – der Fall der Industrie (working title)
Prof. Olav Hohmeyer
Universität Flensburg

Simon Hirzel
Analyse und Bewertung industrieller Energieeffizienzmaßnahmen dargestellt am Beispiel von Druckluftsystemen
Prof. Grit Walther
RWTH Aachen

Judit Kockat
Strategien zur Förderung der energetischen Gebäudesanierung in wachsenden und schrumpfenden Regionen
Prof. Hans Joachim Linke
Technische Universität Darmstadt

Piret Kukk
Speeding up the Development and Implementation of Personalized Cancer Therapeutics in Europe – An Innovation System Perspective
Prof. Marko Hekkert
Utrecht University, The Netherlands

Eve Menger-Krug
Algae-to-Energy Systems as Clean Cycles in the Urban Water Chain
Prof. Stefan Norra
Karlsruhe Institute of Technology

Mirja Meyborg
The role of German universities in a system of joint knowledge generation and innovation – A social network analysis of publications and patents with a focus on the spatial dimension
Prof. Jan Kowalski
Karlsruhe Institute of Technology

Julia Michaelis
Bewertung saisonaler Speicheroptionen in einem gekoppelten System von Strom-, Gas- und Mobilitätssektoren
Prof. Dominik Möst
Technische Universität Darmstadt

Björn Moller
Herstellung, Charakterisierung und Weiterverarbeitung von Carbon Nanotube Dispersionen
Prof. Thomas Hirth
University of Stuttgart

Benjamin Pfluger
Assessment of least cost pathways for decarbonising Europe's power supply. A model-based long-term scenario analysis accounting for the characteristics of renewable energies
Prof. Martin Wietschel
Karlsruhe Institute of Technology

Andreas Sauer
Roadmapping disruptiver Technologien am Beispiel fortgeschrittener Energiespeichertechnologien für die Elektromobilität
Prof. Alexander Gerybadze
University of Hohenheim

Uta Schneider
Elektrische Individualmobilität im Kontext gegenwärtiger und zukünftiger gesellschaftlicher Trends
Prof. Birgit Blättel-Mink
Goethe University, Frankfurt am Main

Philip Schütz
Data Protection Authorities in a Comparative Perspective
Prof. Andreas Busch
University of Göttingen

Etienne Vignola-Gagné
Translational research: history, dominant practises and current provisions for patient involvement
Prof. Herbert Gottweis
University of Vienna, Austria

Ute Weißfloch
Multikriterielle Bewertung von Produkt-Dienstleistungssystemen zur Steigerung der Energieeffizienz von Druckluftsystemen
Prof. Jutta Geldermann
University of Göttingen

Jana Weitkamp
Privacy and Security in the Media – Framing the European Perspective
Prof. Wolfgang Schweiger
University of Hohenheim

PRESENTATIONS

EXAMPLES

Simon Berner
Ressourceneffizienz und Innovationen für die Welt von morgen
‣ 12. Konferenz des Netzwerks Ressourceneffizienz, Berlin

David Biere
Die potenziellen Erstnutzer der Elektromobilität und der Einfluss ihrer möglichen Ladestrategien
‣ Konferenz Kommunales Infrastruktur-Management, Berlin

Antje Bierwisch
Global Scenarios for the Evaluation of Emerging Security Technologies
‣ International Foresight Academic Seminar, Winterthur, Switzerland

Bewertung von Sicherheitstechniken für die Luftsicherheitskontrolle unter Berücksichtigung sozio-technischer Aspekte
‣ Innere Sicherheit seit 9/11. Zur Akzeptanz von Sicherheitsmaßnahmen in Theorie und Praxis – SIRA Abschlusskonferenz, Munich

(with Ralph Seitz)
Foresight – structured engagement with complex futures
‣ State Agency for Technology Innovation (SATI) – Ministry of Science and Technology of Vietnam (MOST), Hanoi, Vietnam

Inga Boie
Scenarios for Renewable Energy Deployment in North African Countries and Electricity Exchange with Europe – A Model-based Analysis for 2050
‣ 3rd International Conference on Power and Energy Systems (ICPES 2013), Bangkok, Thailand

Tobias Boßmann
Die deutsche Stromnachfrage im Jahr 2050: Strukturelle Änderungen der Lastkurve und ihre Auswirkungen auf die Angebotsseite
‣ 8. Internationale Energiewirtschaftstagung an der TU Wien, Vienna, Austria

The shape matters! How structural changes in the electricity load curve affect optimal investments in generation capacity
‣ 10th European Energy Market Conference, EEM13, Stockholm, Sweden

The German load curve in 2050: structural changes through energy efficiency measures and their impacts on the electricity supply side
‣ ECEEE 2013 Summer Study on energy efficiency, Toulon/Hyères, France

Harald Bradke
Energy efficiency – key to the future
‣ 1. Europäischer Energiekongress, Brussels, Belgium

Die Energiewende
‣ Tagung der Zukunftsinitiative Rheinland-Pfalz, Mainz

Energieeffizienz in der Industrie
‣ Tagung der ZVEI-Forschungsgemeinschaft, Frankfurt am Main

Barbara Breitschopf
Impact of policy mix on structural and technological changes in the PV industry
‣ 13th European IAEE Conference: Energy Economics of Phasing out Carbon and Uranium, Düsseldorf

Susanne Bührer
New modes of stakeholder involvement in ex ante impact assessments
‣ International Scientific Evaluation of STI policies, instruments and organisations: new horizons and new challenges, Vienna, Austria

Daniela Buschak
Value of service-enhanced offerings: A network perspective
‣ European Operations Management Association (EurOMA) Conference, Dublin, Ireland

(with Matthias Gotsch)
Significance of service-based business models – A survey in the Machine Tool Building Industry
‣ European Association for Research on Services (RESER) Conference, Aix-en-Provence, France

Sonia Conchi
The Effect of Brain Drain in Germany – Extent and Motivation for Scientists to Work Abroad
‣ EU-SPRI Early Career Research Conference (ECRC), Madrid, Spain

Brain Drain or Brain Circulation? The Extent of German Scientists to Work Abroad
‣ STI 2013 Berlin, 18th International Conference on Science and Technology Indicators, Berlin

Kerstin Cuhls
Innovation in Technik und Gesellschaft – Foresight für den langfristigen Blick
‣ Trendschau des Fraunhofer FOKUS, Berlin

Roadmapping: Comparing cases in China and Germany
‣ International Foresight Academic Seminar, Winterthur, Switzerland

Vorausschau und technologische Trends
‣ Innovationskurs für die IHK Villingen-Schwenningen

Stephanie Daimer
Coincidence or Governance – Requirements and Strategies for the Management of regional Activities of German Higher Education Institutions
‣ EU-SPRI Early Career Research Conference (ECRC), Madrid, Spain

Visions for the European Research Area
‣ 11th Meeting of European Forum on Forward Looking Activities (EFFLA), Brussels, Belgium

Evaluating the novel German "VIP" measure – addressing the stage of translational research between basic research and valorisation
‣ Evaluation of STI policies, instruments and organisations: new horizons and new challenges, Vienna, Austria

David Dallinger
New business models for electric cars – a holistic approach
‣ The 2013 Armand Peugeot conference, Paris, France

The contribution of vehicle-to-grid to balance fluctuating generation: Comparing different battery aging approaches
‣ 8th Conference on sustainable development of energy water and environment systems – SDEWES, Dubrovnik, Croatia

Electric Mobility and Smart Society in the project intelligent Zero Emission Urban System – iZEUS
‣ 20th ITS World Congress Tokyo 2013, Tokyo, Japan

Claus Doll
Determinants of Good Transport Crises Management
‣ *Transportation Research Board (TRB)* 92nd Annual Meeting, Washington DC, USA

Economic Impacts of Non-Technical Measures for Emission Reduction in Transport
‣ WHO THE-PEP Regional Workshop, Almaty, Kazakhstan

The Private and Public Economics of Sustainable Mobility Patterns
‣ 13th World Conference on Transport Research (WCTR), Rio de Janeiro, Brazil

Ewa Dönitz
Foresight and Innovation
‣ Innovation, Soignies, Belgium

Methoden der Vorausschau und Innovationen
‣ Open Innovation Forum "OpenAlps", St. Georgen

Friedrich Dornbusch
Universities as local knowledge hubs under different technology regimes – New evidence from academic patenting
‣ EU-SPRI Early Career Research Conference (ECRC), Madrid, Spain

Universities as local knowledge hubs under different technology regimes – New evidence from academic patenting
‣ The 35th DRUID Celebration Conference, Barcelona, Spain

PRESENTATIONS

Vicki Duscha
Sector mitigation targets in a global economic analysis
‣ Side Event Mitigation around the globe: Examples of how science can inform policy makers, Klimakonferenz (COP 19), Warsaw, Poland

Elisabeth Dütschke
Fehlt es an Begeisterung für E-Autos?
‣ Smarte Städte smarte Mobilität, Graz, Austria

Verhaltensänderungen für den Klimaschutz: Bedeutung, Barrieren und politische Ansatzpunkte
‣ Berliner Energietage, Berlin

Rebound effects in residential lighting – Conceptual psychological framework and empirical findings
‣ ECEEE 2013 Summer Study on energy efficiency, Toulon/Hyères, France

Wolfgang Eichhammer
The Contribution of Energy Efficiency Measures to Climate Protection within the EU
‣ Rethinking Franco-German Cooperation in the Context of Energy Transitions – Expert Dialogue on Energy Efficiency: How to Combine Incentives and Regulation?, Berlin

Indicators to Monitor the German Energiewende
‣ IEA Energy Efficiency Indicators Workshop New Challenge: Doing so much more with so much less, Paris, France

Lessons learnt from benchmarking in Europe
‣ China-Australia Carbon Market Design Expert Workshop Allocation Approaches and Lessons learnt so far, Beijing, China

Tobias Fleiter
The characteristics of industrial energy-efficiency measures – How do they affect the adoption decision by firms?
‣ Chalmers Energy Conference, Goteborg, Sweden

Ex ante estimation of the EU Ecodesign Directive's impact on the long-term electricity demand of the tertiary sector
‣ ECEEE 2013 Summer Study on energy efficiency, Toulon/Hyères, France

Towards bottom-up modeling industrial sector ETS emissions and abatement costs
‣ Symposium on theoretical advances and empirical lessons on emission trading schemes, Beijing, China

Michael Friedewald
Public perception of security and privacy
‣ 13. Österreichische Konferenz zur Technikfolgenabschätzung, Vienna, Austria

Privacy in the Internet World
‣ First European Conference on Technology Assessment, Prague, Czech Republic

Being Human and Making Society in the Digital Age
‣ 7th International Computer, Privacy and Data Protection Conference, Brussels, Belgium

Nele Friedrichsen
Governance intelligenter Energieversorgungssysteme
‣ 2. Darmstädter Ingenieurkongress – Bau und Umwelt, Session Smart Energy Cities, Darmstadt

Good Governance von Smart Grids, Unbundling und Marktdesign
‣ Arbeitsgemeinschaft E-Energy BITKOM, Bonn

Rainer Frietsch
The technological profiles of Beijing and Bohai Bay Area – patenting activities in China, Europe and the USA
‣ Sino-German Symposium on Technology Innovation System, Beijing, China

Is the content of academic patents also published in scientific journal articles?
‣ 3rd Global Tech-Mining Conference, Atlanta, USA

The impact of the patent attorney on the outcome of the filing process
‣ Atlanta Conference on Science and Innovation Policy, Atlanta, USA

Simon Funke
The potential of electric and non-electric bicycles to reduce energy consumption and emissions in private transport
‣ ECEEE 2013 Summer Study on energy efficiency, Toulon/Hyères, France

Joachim Globisch
Acceptance of Electric Vehicles by Commercial Users in the Electric Mobility Pilot Regions in Germany
‣ ECEEE 2013 Summer Study on energy efficiency, Toulon/Hyères, France

Elektrofahrzeuge in Fahrzeugflotten: Wirtschaftlichkeit, Kompatibilität, Akzeptanz
‣ Neue Mobilitätslösungen für Berliner Unternehmen, Berlin

Till Gnann
What is the future of public charging infrastructure for electric vehicles? A techno-economic assessment of public charging points for Germany
‣ ECEEE 2013 Summer Study on energy efficiency, Toulon/Hyères, France

Kerstin Goos
Public Engagement and RRI – The search for meaningful engagement
‣ S.NET 5th Annual Conference, Boston, USA

Matthias Gotsch
Can we forget about surveys to measure service innovation? A Trademark Approach for Knowledge Intensive Business Services
‣ Frontiers in Services Conference, Taipei, Taiwan

Stephan Grandt
SIRA-Value: Bewertung innovativer Sicherheitstechnologien im zivilen Luftverkehr
‣ Innosecure 2013, Velbert

Bruno Gransche
Technisierung von Sicherheit – Barometer Sicherheit Deutschland BaSiD
‣ TA13 Sicherheit als Technik, Vienna, Austria

Wandel von Autonomie und Kontrolle durch neue Formen der Mensch-Technik-Interaktion
‣ BMBF-Zukunftskongress Technik zum Menschen bringen, Berlin

Inszenierung als Virtualisierung – Konsumgenetik und Neuropädagogik
‣ Virtualisierung und Mediatisierung kultureller Räume. Die Neuen Medien – Gewinne, Verluste, Gefahren. CultMedia Jahrestagung, Potsdam

Andrea Herbst
Mutually linking bottom-up energy demand models with macroeconomic models – dealing with inter- and intra-sectoral structural change
‣ International Association for Energy Economics (IAEE), International Conference, Daegu, South Korea

Tim Hettesheimer
Future Trends of the Automotive Li-Ion Battery Supply Chain
‣ International Conference of the System Dynamics Society, Cambridge, Massachusetts, USA

Nils Heyen
Wieder die Entscheidungsfalle: Professionalisierte ärztliche Beratung in der Schwangerschaft
‣ Tagung "Wenn ich das vorher gewusst hätte! Schwangerschaft als Entscheidungsfall(e)" Deutsches Hygiene-Museum, Dresden

Das deutsche Gesundheitswesen aus Innovationssystemperspektive
‣ Treffen des Arbeitskreises Gesundheit des Vereins Berliner Kaufleute und Industrieller (VBKI), Ludwig Erhard Haus, Berlin

(with Anne-Charlotte Hoes)
The Current Assessment Situation with regard to Nanotechnology, Synthetic Biology, Biofuels and Cloud Computing
‣ European Technology Assessment Conference "Technology Assessment and Policy Areas of Great Transitions" National Technical Library, Prague, Czech Republic

Harald Hiessl
Intelligenter Umgang mit Niederschlagswasser: Lösungsperspektiven. 1. Deutscher Kanalnetzbewirtschaftungstag
‣ Technische Akademie Hannover e.V., Geisingen

TWIST++: Transitionswege Wasserinfrastruktursysteme: Anpassung an neue Herausforderungen im städtischen und ländlichen Raum
‣ Kick-off-Tagung der BMBF-Fördermaßnahme INIS Intelligente und multifunktionelle Infrastruktursysteme für eine zukunftsfähige Wasserversorgung und Abwasserentsorgung, Berlin

Thomas Hillenbrand
Mögliche Maßnahmen bzw. Maßnahmenkombinationen zur Emissionsminderung bei Mikroschadstoffen
- Fachgespräch Maßnahmen zur Verminderung des Eintrages von Mikroschadstoffen in die Gewässer, Berlin

Miriam Hufnagl
National innovation strategies: problem orientated design, interdepartmental coordination? Insights from Germany, Sweden and the UK
- S.NET 5th Annual Conference, Boston, USA

Nationale Innovationsstrategien: problemorientiert konzipiert, ressortübergreifend koordiniert? Einsichten aus Schweden, Großbritannien und Deutschland
- 3-Länder-Tagung „Politik der Vielfalt" der DVPW, ÖGPW und SVPW, Universität Innsbruck, Austria

Policy Challenges of Smart Specialisation Strategies (S3) – conceptual thoughts
- Séminaire evoREG: Innovation, connectivité et évolution: quelles perspectives et politiques pour le Rhin Supérieur? Bureau d'economie theoretique et appliquée, University of Strasbourg, France

Torsten Hummen
Review zur systematischen Umweltbewertung von Innovationen im frühen Stadium
- ÖKOBILANZ – WERKSTATT 2013, Graz, Austria

Angela Jäger
Teamwork and performance. Evidence from a European large-scale survey
- IWOT 17 – International Workshop on Team Working, Leiden, The Netherlands

Petra Jung Erceg
Non-Technological Innovation
- Promoting Innovation through Education and Research, KEN Forum 2013, Cape Town, South Africa

The Impact of Non-Technological Innovation
- Promoting Innovation through Education and Research, Brussels, Belgium

Kreativität und Innovation im Demografischen Wandel
- Wissensforum der Gesellschaft für Wissensmanagement e.V., Berlin

Victoria Kayser
Text Mining for Technology Roadmapping – The Strategic Value of Information
- 6th ISPIM Innovation Symposium, Melbourne, Australia

Jan Kersting
First-mover advantage of defecting coalitions in international climate negotiations
- 26th European Conference On Operational Research, Rome, Italy

Possibilities for international cooperation in different negotiation environments
- Symposium: Theoretical Advances and Empirical Lessons on Emission Trading Schemes, Beijing, China

Simone Kimpeler
Foresight – der strategische Umgang mit Zukünften
- Hessischer Fördertag 2013, Darmstadt

Entwicklung eines mehrsprachigen Web-Monitoring-Instruments am Beispiel eines Foresight-Projekts zu Gesellschaftstrends
- Jahrestagung der DGPuK-Fachgruppe Computervermittelte Kommunikation, Vienna, Austria

Oliver Kleine
Wirtschaftlichkeitsbewertung neuartiger Service-Roboter-Lösungen
- TCW-Technikforum Robotik, Nördlingen

Wertschöpfung in China – Produktion oder auch F&E. Quantitative und qualitative Befunde zu den Wertschöpfungsaktivitäten deutscher Unternehmen in China
- 3. Forum Internationalisierung OWL, Bielefeld

Status quo der industriellen Service Supply Chain in der Deutschland AG. Quantitative und qualitative Befunde des Fraunhofer ISI
- AK-Schmalenbach, Meitingen

Marian Klobasa
Evaluation des bisherigen Marktprämienmodells
- Windenergie Direktvermarktung, Hamburg

Lastmanagementpotenziale und deren Beitrag zur Versorgungssicherheit in Süddeutschland
- BMWI Kraftwerkforum, Berlin

Lastmanagement – Erfahrungen und zukünftiger Beitrag zur Integration Erneuerbarer Energien
- Energiespeicher-Symposium 2013, Stuttgart

Knut Koschatzky
Infrastrukturen in der Wissensgesellschaft
- Auftaktveranstaltung zum IHK Jahresthema 2013, Wie sehen moderne Infrastrukturen für morgen aus? Würzburg

The role of universities in new forms of strategic research collaboration with industry
- Jena Economic Research SEMINAR, Jena

The Regional and the Local – Accentuation of Spatial Proximity in National Innovation Policy RIP
- 8th International SEMINAR, Donostia/San Sebastian, Spain

Michael Krail
Anforderungen der Energiewende im Verkehr
- BMWI Energieeffizienz, Frankfurt am Main

Socio-Economic Impact Assessment of Sustainable Transport Policies
- European Transport Conference 2013, Frankfurt am Main

Henning Kroll
Smart Specialisation – Different Approaches and Rationales at the Beginning of the New Support Period
- 53rd ERSA Congress, Palermo, Italy

Public Private Cooperations for Innovation – Different Approaches and Rationales
- RIM-Plus-Workshop, Brussels, Belgium

Technology transfer – conceptual and empirical insights
- 2013 Sino-German Symposium on Technology Innovation System, Beijing, China

Marianne Kulicke
Innovationsfinanzierung als unternehmerische Herausforderung
- Industrieausschuss bei der IHK Südlicher Oberrhein, Lahr

EXIST-SEED und EXIST-Gründerstipendium: Realisierungs- und Überlebensquoten, Gründe für die Aufgabe und ökonomische Entwicklung der entstandenen Gründungen
- EXIST-Workshop Good Practice bei der Frühphasen-Finanzierung und in anderen Bereichen der Gründungsunterstützung, Düsseldorf

Christian Lerch
Towards a Typology for Service Markets in Manufacturing Industries – An empirical analysis with managerial implications
- Spring Servitization Conference, Birmingham, Great Britain

Ralf Lindner
Responsible Research and Innovation: Ein neuer Ansatz in der Innovationspolitik und dessen besondere Koordinationsanforderungen
- 3-Länder-Tagung "Politik der Vielfalt" der DVPW, ÖGPW und SVPW, Universität Innsbruck, Austria

Responsible research and innovation and the policy coordination challenge society for the study of nanoscience and emerging technologies
- S.NET 5th Annual Conference, Boston, USA

Frank Marscheider-Weidemann
Recycling von Elektromotoren
- Fraunhofer-Symposium Netzwert 2013, Munich

Katharina Mattes
Increased Raw Material Efficiency through Product-Service Systems in Resource-intensive Production Processes? Barriers, Chances and an Assessment Approach
- The 5th CIRP Conference on Industrial Product-Service Systems: Product-Service Integration for Sustainable Solutions, Bochum

PRESENTATIONS

Usage of renewable energy technologies in the German Manufacturing Industry
- SPIM: The XXIV ISPIM Conference – Innovating in Global Markets: Challenges for Sustainable Growth, Helsinki, Finland

Adoption and Diffusion of Renewable Energy Technologies: Influence of the Policy Mix in the Manufacturing Industry
- 13th European IAEE Conference: Energy Economics of Phasing out Carbon and Uranium, Düsseldorf

Lucia Mejia Dorantes
Transportation infrastructure impacts house prices and firms´ location: The effect of a new metro line in the suburbs of Madrid
- TRB 2013 Washington DC, USA

(with K. Lucas)
Transport infrastructure investment and regeneration: A necessary but insufficient policy measure
- 13th World Conference on Transport Research (WCTR), Rio de Janeiro, Brazil

(with Joachim Schleich and Rainer Walz)
A first approach to test spatial effects on patents for wind power technologies
- 6th SEMINAR Jean Paelinck, Madrid, Spain

Julia Michaelis
Evaluation of hydrogen storage systems for surplus electricity in the German Energy Sector
- ENERDAY 8th Conference on Energy Economics and Technology, Dresden

Carolin Michels
The Relationship between a Topic's Interdisciplinarity and its Innovativeness (Poster Presentation)
- 14th International Society of Scientometrics and Informetrics Conference, Vienna, Austria

Björn Moller
Molecular Sorting – Wie zukunftssicher sind die entwickelten Technologien?
- Open Source Workshop Molecular Sorting, Darmstadt

Herstellung, Charakterisierung und Weiterverarbeitung von Carbon Nanotube Dispersionen
- Promotionsvortrag, Universität Stuttgart

Roadmapping – methodology and aim
- Roadmapping-Workshop Foodmanufuture, Brussels, Belgium

Peter Neuhäusler
The Technological Competitiveness of China – Patents in China and Abroad
- 2013 Sino-German Symposium on Technology Innovation System, Beijing, China

(with Friedrich Dornbusch)
Comparing universities, small and large firms in knowledge production and dissemination – A focus on academic knowledge as a driver for technological innovation
- Atlanta Conference on Science and Innovation Policy 2013, Atlanta, USA

Jutta Niederste-Hollenberg
Technik und Energieeffizienz
- Tagung des Verbands der Wohnungsbaugesellschaften, Bonn

*z*dez – centralized operation of decentralized small-scale wastewater treatment plants*
- Deutsch-französische Konferenz zur zukunftsfähigen Wasserwirtschaft, Nancy, France

Katrin Ostertag
Perspektiven für die Bewertung von Ressourceneffizienz – Erfahrungen aus r²
- Kick-off r³ – Innovative Technologien für Ressourceneffizienz – Strategische Metalle und Mineralien, Freiberg

Anja Peters
Veränderungsprozesse in der Automobilproduktion
- Fachtagung der Hans-Böckler-Stiftung und des Deutschen Gewerkschaftsbundes NRW, Iserlohn

(with Wolfgang Schade)
Bundestagsinterne Präsentation der TAB-Berichte "Zukunft der Automobilindustrie" und "Konzepte der Elektromobilität und deren Bedeutung für Wirtschaft, Gesellschaft und Umwelt"
- Bundestagssitzung, Berlin

(with Elisabeth Dütschke and Joachim Schleich)
Exploring and analyzing relevance and psychological drivers of rebound effects
- Science for the Environment Conference, Aarhus, Denmark

Patrick Plötz
Who should buy electric vehicles? The potential early adopter from an economical perspective
- ECEEE 2013 Summer Study on energy efficiency, Toulon/Hyères, France

How well can early adopters of electric vehicles be identified?
- EVS 27, Barcelona, Spain

Elektromobilität im Wirtschaftsverkehr – Eine Potenzialanalyse
- Kongress Elektromobilität, Berlin

Martin Pudlik
Policy proposals on maximizing regional cooperation – The case of Gobitec
- Gobitec and the Asian Supergrid for renewables in Northeast Asia, Irkutsk, Russia

Oberschlesien und das Ruhrgebiet – Eine vergleichende Perspektive im Hinblick auf endogene Entwicklungspotentiale
- Deutscher Geographentag, Passau

Modeling of renewable energy potential – The example of Europe, North Africa and an outlook on Pakistan
- International Symposium on Solar Thermal Energy, Islamabad, Pakistan

Mario Ragwitz
Ideas to incentivise RES System Responsibility and Market Integration
- Coordinated Action on Renewable Energy Sources, Berlin

Instrumente zur Fortentwicklung des EEG
- Fachtagung des BMU zur Energiewende, Berlin

EU Renewable energy support schemes – Status quo and need for reform
- Member State meeting on support schemes for renewable energy, Brussels, Belgium

Kristin Reichardt
Towards a uniform and comprehensive policy mix conceptualization. The case of renewable power generation technologies
- Workshop: Designing optimal policy mixes: Principles and methods, Singapore

Towards a more comprehensive policy mix conceptualization for environmental technological change: a literature synthesis
- ESEE 2013 Conference, Lille, France

Thomas Reiß
Synthetische Biologie – Herausforderungen für Innovation, Ethik und Akzeptanz
- Vortragsreihe Technik und Ethik des Munich Center for Technology in Society, Technische Universität München

Strategies for synthetic biology development in Europe – The TESSY roadmap
- OECD DSTI/STP/ 32nd Session of the Working Party on Biotechnology: Thematic Discussion on Strategic Roadmaps for Synthetic Biology, Paris, France

Trends in synthetic biology based on patent data EU workshop on Synthetic Biology – IP, standards and regulatory issues
- Royal Society of Chemistry, London, Great Britain

Clemens Rohde
Policy options for energetic retrofit of buildings
- ECEEE 2013 Summer Study on energy efficiency, Toulon/Hyères, France

Welche wirtschaftlichen Energieeffizienzpotenziale sind vorhanden und welche Maßnahmen setzen Unternehmen um?
- dena-Fachtagung Energieaudits, Energieberatung und Energiemanagement – wirtschaftliche Energieeffizienzpotenziale in Unternehmen erkennen und erschließen, Berlin

Philip Roth
Ideenbezogene Konsultationsprozesse – wie Soziale Netzwerke die Innovationskraft von Unternehmen bestimmen
- Symposium für Vorausschau und Technologieplanung, Berlin

Christian Sartorius
Macroeconomic effects of an increase in resource productivity – Modelling tools and data requirements
▸ Workshop Data and Models for Resource Policy Assessments, Bundesumweltministerium und Umweltbundesamt, Berlin

TAB-Bericht Wasser – Rahmenbedingungen einer nachhaltigen Wasserwirtschaft in Deutschland
▸ Deutsch-französischer Kongress Dezentrales Wasser-Management, Nancy, France

Wolfgang Schade
Mobilität von morgen: Wege zu einer nachhaltigen Mobilität. Worauf muss sich der ÖPNV vorbereiten?
▸ Leitvortrag zur Podiumsdiskussion auf dem 6. ÖPNV Innovationskongress: Mobilitätskonzepte für Bus und Bahn, Freiburg

The future of transport: Why and how can we do more with less resources?
▸ Key Note, 16th EURO Working Group on Transportation, Porto, Portugal

Strategies for the transition to electric mobility
▸ CEPS Task Force on Transport and Climate Change, Brussels, Belgium

Elna Schirrmeister (with Simone Kimpeler and Philine Warnke)
Zukunfts-Literacy Trainer
▸ ITA-Forum 2013, Berlin

Joachim Schleich
How much shift in demand? Findings from a field experiment in Germany
▸ ECEEE 2013 Summer Study, Presqu'île de Giens, France

Interaction of Sectoral Targets and Emissions Trading Systems – Analyzing Competitiveness and Leakage with a global CGE Model
▸ IPM CAS – Fraunhofer ISI Symposium on theoretical advances and empirical lessons on emission trading schemes, Beijing, China

Citizens' perceptions of distributional justice and trust in international climate policy – empirical insights from China, Germany and the US
▸ Side Event, UN Climate Summit, Warsaw, Poland

Barbara Schlomann
Enough electicity being saved? Impact of energy efficiency policies addressing electrical household appliances in Germany until 2030
▸ ECEEE 2013 Summer Study, Presqu'île de Giens, France

The role of energy efficiency potentials in a 2030 target system for climate and energy policy
▸ ECEEE Annual Policy SEMINAR, Brussels, Belgium

Esther Schnabl
Innovation und Innovationssysteme
▸ Inno Talk, Villingen-Schwenningen

Uta Schneider
Public charging infrastructure for electric vehicles – wishes and reality
▸ Workshop future mobility. Markets and policy measures in the evolution of electric mobility, Jacobs University Bremen, CRIE, Universität Bremen und OFFIS e.V., Oldenburg

How does user acceptance of electric vehicles develop over time?
▸ Symposium Psychological factors influencing the adoption of electric vehicles, 10th Biennial Conference on Environmental Psychology, Otto-von-Guericke Universität, Magdeburg

Electric vehicles in individualized societies. The relationship between the attitudes towards automobility and user acceptance of electric mobility
▸ Global Conference on Mobility Futures, Lancaster, Great Britain

Torben Schubert
Do higher wages reduce inventors' job turnover? The role of utility, status and signaling effects
▸ European Business Research Conference, Rome, Italy

The Impact of Innovation Offshoring on the Effectiveness of Organizational Adaptation
▸ Science Policy Conference, Atlanta, USA

Implementing an R&D Strategy without Prior R&D-Experience
▸ The 35th DRUID Celebration Conference, Barcelona, Spain

Florian Senger
Measures to influence a long-term shift in freight modal share in Germany
▸ 13th World Conference on Transport Research (WCTR), Rio de Janeiro, Brazil

Agent-based modelling of the acceptance of innovations combining evolutionary and socio-physical methods
▸ First Workshop on Modelling Social Energy Practices, Guildford, Great Britain

Frank Sensfuß
Integration Erneuerbarer Energien in den Strommarkt
▸ Plattform Erneuerbare Energien, Berlin

Herausforderungen für die Strommärkte
▸ BMU-Fachtagung Erneuerbare Energien, Berlin

Oliver Som
Absorptive capacity of non-R&D intensive firms in the German manufacturing industry
▸ The 35th DRUID Celebration Conference, Barcelona, Spain

Innovation without R&D
▸ Chinese Academy of Engineering (CAE), Beijing, China

European Manufacturing Survey – exploring its benefits and potentials for evidence-based innovation and technology policy-making
▸ DG Enterprise and Industry, Brussels, Belgium

Thomas Stahlecker
Recent experience with German regional innovation and cluster policies: approaches, rationales and possible transfer to Kazakhstan
▸ Methodology of Development of Regional Innovation Systems, UNECE, Astana, Kazakhstan

Experiences from Germany on Clusters for SMEs
▸ CNI-Seminar: Think Small First: European Policy for Small and Medium Enterprises, Brasilia, Brazil

Regional Innovations and their evaluation in Germany – the Case of European Structural Funds
▸ 2nd RISTEX Workshop for Research Funding Program on Science of Science, Technology and Innovation Policy, Tokyo, Japan

Ulrike Tagscherer
Science-Industry Linkages in China – How MNC cooperate with Chinese Academia
▸ EU-China Workshop on Joint Research Structures (JRS) in China, Beijing, China

Innovation made in China – Fiction or Reality?
▸ DAAD Stipendiatentreffen, Beijing, China

Luis Tercero Espinoza
Kritische Rohstoffe in der EU – Bewertungsgrundlagen
▸ BGR Rohstoffkonferenz 2013, Hannover

Critical raw materials for the EU – Methodology and Results
▸ US-Japan-EU trilateral workshop on Critical Raw Materials, Brussels, Belgium

Felix Tettenborn
Trends der industriellen Wassernutzung
▸ Forum Umwelttechnik BW, Technologie- und Innovationszentrum Umwelttechnik und Ressourceneffizienz Baden-Württemberg GmbH, Böblingen

Rainer Walz
Modelling lead market based export potentials for OECD and Newly Industrializing countries – a system dynamics approach for wind turbines
▸ 4th International Conference on Sustainability Transitions, Zurich, Switzerland

How do LCD innovations differ: specificities of low carbon technologies and energy systems
▸ Globelics Turkey 11th Globelics International Conference, Ankara, Turkey

Kritikalität, Umweltlasten, Systemgrenzen und Life-Cycle-Assessment
‣ Tagung Strategische Metalle für die Energiewende der Evangelischen Akademie, Tutzing

Marion A. Weissenberger-Eibl
Die Zukunft Österreichs in der Welt von morgen: Was kann Foresight für politische Entscheidungsprozesse leisten?
‣ Podiumsdiskussion Die Zukunft Österreichs in der Welt von morgen: Was kann Foresight für politische Entscheidungsprozesse leisten?, Vienna, Austria

Globale Wertschöpfung – Produktionsverlagerungen der deutschen Wirtschaft
‣ Sitzung des Frachtbeirats der Fraport AG, Frankfurt am Main

Culture as a resource for Innovation
‣ Beijing Academy of Science and Technology – Conference, Beijing, China

Martin Wietschel
Spielen Elektrofahrzeuge bei gewerblichen Anwendungen künftig eine Rolle?
‣ NUFAM, Treffpunkt Kommunal, Karlsruhe

Energiewende für Jedermann? Sozialverträgliche Energiewende oder doch Fass ohne Boden? Über die Notwendigkeit und die Herausforderung der Energiewende
‣ Bundestagswahl 2013, Ringvorlesung Politikwissenschaft, Mainz

Wie viele Elektrofahrzeuge sind in einer Carsharing-Flotte sinnvoll?
‣ IAA-Symposium CarSharing, Frankfurt am Main

Jenny Winkler
Strategic bidding of electricity market participants and the occurrence of scarcity prices and sufficient investment incentives in energy-only markets – future research needs
‣ 13th European IAEE Conference: Energy Economics of Phasing out Carbon and Uranium, Düsseldorf

Weiterentwicklung des Fördersystems für Erneuerbare Energien unter Berücksichtigung eines zukünftigen Strommarktdesigns
‣ EEG Informations- und Diskussionsveranstaltung, Kiel

Katharina Wohlfarth
Leichtbaufahrzeuge im Taxibetrieb – ein vielversprechendes Zukunftskonzept für Städte?
‣ 5. Wissenschaftsforum Mobilität, Duisburg

Sven Wydra
Challenges for technology diffusion policy to achieve socio-economic goals
‣ Atlanta Conference on Science and Innovation Policy, Atlanta, USA

Christoph Zanker
Dienstleistungsbasierte Geschäftsmodelle für produzierende Unternehmen – Potenziale und Herausforderungen
‣ 2. Treffen des Service Circle, Stuttgart-Hohenheim

Innovationspfade jenseits von Forschung und Entwicklung
‣ 10. Forum Innovation, Vienna, Austria

Andrea Zenker
Collaboration in Research and Innovation between France and Germany: Some Findings
‣ Launch evoREG Chair, Strasbourg, France

Kreativität, Wissen und Innovation. Das Konzept der "Wissensengel"
‣ 11. Karlsruher Symposium für Wissensmanagement, Karlsruhe

(with Emmanuel Muller)
The transformative power of service innovation. Theoretical concepts and empirical findings
‣ ESIC Validation Workshop, Brussels, Belgium

Peter Zoche
Sicher mit Technik?
‣ Fachkongress innosecure-Workshop zu Technisierung von Sicherheit – Diskurs, Ethik, Partizipation, Velbert

Fachdialog der Gesellschaftlichen Disziplinen
‣ Sichere Gesellschaften – Gesellschaftliche Aspekte der europäischen Sicherheitsforschung, Brussels, Belgium

Einführung in das Thema
‣ Der Wandel der Sicherheitskultur als Herausforderung für die Politik, Berlin

PROJECTS

ENERGY POLICY AND ENERGY MARKETS

- Consultancy Services for a Combined Renewable Energy Master Plan for Egypt
Inga Boie

- Analysis of the RES technology diffusion under the DP2050 and future EU-MENA RES-E support schemes
Inga Boie

- Study on the impact of ecodesign and energy label/tyre labelling implementing measures on R&D and technological innovation
Sibylle Braungardt

- Vorbereitung und Begleitung bei der Erstellung eines Erfahrungsberichtes gemäß § 18 Erneuerbare-Energien-Wärmegesetz
Barbara Breitschopf

- Analyse zu übergreifenden einzel- und gesamtwirtschaftlichen Nutzen- und Verteilungswirkungen des Ausbaus EE unter Berücksichtigung der Wechselwirkungen zwischen den Bereichen Strom, Wärme und Verkehr
Barbara Breitschopf

- Überprüfung der aktuellen Ausnahmeregelungen für die Industrie im Bereich des EEG im Hinblick auf Treffsicherheit und Konsistenz mit anderen Ausnahmeregelungen im Energiebereich unter besonderer Berücksichtigung der internationalen Wettbewerbsfähigkeit und Strompreissituation
Barbara Breitschopf

- Policy Instruments to Support RE Industrial Value Chain Development
Barbara Breitschopf

- Methodological Chapter of the IRENA Green Jobs 2013 publication
Barbara Breitschopf

- Cooperative regimes for future climate policy (CORE) – Teilvorhaben 1
Vicki Duscha

- Ausweitung des Emissionshandels auf neue Sektoren und Kleinemittenten (z. B. Gebäudebereich) – Potenziale, Ausgestaltung, Verbindung mit dem internationalen Klimaregime
Vicki Duscha

- Emissionsminderung in Industriestaaten und Entwicklungsländern – Kosten, Potenziale und ökologische Wirksamkeit
Vicki Duscha

- Evaluierung und Weiterentwicklung des EU-Emissionshandels (EU-ETS-5)
Vicki Duscha

- Technical assistance in preparation of the 2014 report on progress in renewable energy sustainability of biofuels and renewable energy modelling (3 lots)
Vicki Duscha

- Untersuchung der klimapolitischen Wirksamkeit des Emissionshandels – Erweiterte Analysen
Vicki Duscha

- Instrumente zur Erhöhung weltweiter Klimaschutzanstrengungen vor 2020 – ökonomische und politische Implikationen in ausgewählten Industrie- und Schwellenländern
Vicki Duscha

- Minderungsverpflichtungen und faire Lastenteilung in einem neuen umfassenden Klimaschutzabkommen ab 2020
Vicki Duscha

- Verbesserung der methodischen Grundlagen und Erstellung eines Treibhausgasemissionsszenarios als Grundlage für den Projektionsbericht 2011 im Rahmen des EU-Treibhausgasmonitorings
Wolfgang Eichhammer

- Klimaschutzszenario 2050
Wolfgang Eichhammer

- Unterstützung der GIZ China im Programm Energiepolitik und Energieeffizienz (EPEE)
Wolfgang Eichhammer

- Monitoring of energy efficiency in Europe: ODYSSEE MURE
Wolfgang Eichhammer

- Unterstützung bei der Umsetzung der Energieeffizienz-Richtlinie der EU (EED) in Luxemburg und Erstellung des nächsten Nationalen Energieeffizienzplans für Luxemburg
Wolfgang Eichhammer

- Energy Savings 2030: on the 2050 pathway
Wolfgang Eichhammer

- Study evaluating the current energy efficiency policy framework in the EU and providing orientation on policy options for realising the cost-effective energy-efficiency/saving potential until 2020 and beyond
Wolfgang Eichhammer

- Policy DIAlogue on the assessment and COnvergence of RES policy in EU Member States
Anne Held

- Estimating costs of renewable energies compared to conventional energy sources up to 2030 and beyond
Anne Held

- Direktvermarktung von Strom aus erneuerbaren Energien
Marian Klobasa

- KomMa-P – Komplementäre Nutzung verschiedener Energieversorgungskonzepte als Motor gesellschaftlicher Akzeptanz und individueller Partizipation zur Transformation eines robusten Energiesystems
Marian Klobasa

- Gutachten zur CO_2-Minderung im Stromsektor durch den Einsatz erneuerbarer Energien. Update für 2010 und 2011
Marian Klobasa

- Lastmanagement als Beitrag zur Deckung des Spitzenlastbedarfs in Süddeutschland
Marian Klobasa

- Gekoppelte Optimierung von Flexibilitäten in Energieerzeugung sowie Verbrauch unter Berücksichtigung der Auskopplung in andere Märkte (Wärme)
Marian Klobasa

- Rechtliche und instrumentelle Weiterentwicklung des EEG (Vorhaben III des EEG-Erfahrungsberichts)
Benjamin Pfluger

- Langfristszenarien und Strategien für den Ausbau der Erneuerbaren Energien in Deutschland unter besonderer Berücksichtigung der nachhaltigen Entwicklung sowie regionaler Aspekte
Benjamin Pfluger

- Regional study on the Gobitec and Asian Super Grid for renewable energies in North-East Asia
Martin Pudlik

- Erneuerbare Energien als Leitlinie für das Marktdesign der Zukunft – Untersuchung zu Leistungsfähigkeit und Weiterentwicklungsoptionen der Strommärkte für die effektive und effiziente Integration erneuerbarer Energien
Martin Pudlik

- Erarbeitung einer integrierten Wärme- und Kältestrategie für das BMU
Mario Ragwitz

- Beyond 2020: Design & impact of a harmonised policy for RES(E) in Europe
Mario Ragwitz

- Keep-on-track!
Mario Ragwitz

- Support activities for assessment of progress in renewable energy and sustainability of biofuels
Mario Ragwitz

- Wissenschaftliche Beratung Luxemburgs zur Ausgestaltung der Förderinstrumente für erneuerbare Energien im Strom- und Wärmesektor
Mario Ragwitz

- Wissenschaftliche Begleitung und Unterstützung der International Feed-in-Cooperation (IFIC)
Mario Ragwitz

- Review of the production cost advice for the renewable energy incentive (SDE+) in 2013
Mario Ragwitz

- Zukunftswerkstatt Erneuerbare Energien
Mario Ragwitz

- Wissenschaftliche Unterstützung bei Fragen der Weiterentwicklung der europäischen Rahmenbedingungen zur Förderung erneuerbarer Energien im europäischen Energiemarkt
Mario Ragwitz

- Technical assistance in preparation of the 2014 report on progress in renewable energy, (sustainability of biofuels and renewable energy modelling) – Lot 1
Mario Ragwitz

- Cooperation between EU Member States under the Renewable Energy Directive and interaction with support schemes.
Mario Ragwitz

- Wissenschaftliche Begleitung bei der Förderung der erneuerbaren Energien im Rahmen des Mittelmeersolarplanes (MSP) und der Kooperation mit dem Sekretariat sowie den Mitgliedsstaaten der Union für das Mittelmeer (UfM)
Mario Ragwitz

- The post-2020 framework for investments in renewable generation in Europe
Mario Ragwitz

- Komponenten und Systeme zur Gleichspannungskopplung von Erzeugern, Speichern und Verbrauchern im europäisch-afrikanischen Netzverbund (SuperGrid)
Mario Ragwitz

- RESPONSES – European responses to climate change: deep emissions reductions and mainstreaming of mitigation and adaptation
Kristin Reichardt

- The impact of the German policy mix on technological and structural change in renewable power generation technologies
Karoline Rogge

- Exploring transition pathways to sustainable, low carbon societies
Karoline Rogge

- The Relevance of Voluntary Efforts and Fairness Preferences for the Success of International Climate Policy: A Theoretical and Empirical Analysis at the Individual Level
Joachim Schleich

- Energieverbrauch des Sektors Gewerbe, Handel, Dienstleistungen (GHD) in Deutschland für die Jahre 2011 bis 2013
Barbara Schlomann

- Methoden- und Indikatorenentwicklung für Kenndaten zum Klimaschutz im Energiebereich
Barbara Schlomann

- Erstellung und Generierung von Treibhausgasemissionsszenarien als Grundlage für den Projektionsbericht 2013
Barbara Schlomann

- Wissenschaftliche Handlungsempfehlungen zur Weiterentwicklung der Maßnahmen und Instrumente für die Energiewende in Deutschland
Barbara Schlomann

- Vorbereitung des Nationalen Energieeffizienz-Aktionsplans 2014 der Bundesregierung für die Berichtspflichten im Bereich Maßnahmen und Energieeinsparungen (gemäß Artikel 24 i.V.m. Anh. XIV Teil 2 Nr. 2 EU-Energieeffizienzrichtlinie)
Barbara Schlomann

PROJECTS

- Kombinierte Modellierung der Strom- und Wärmeversorgung
Frank Sensfuß

- Verbundprojekt: Perspektiven für die langfristige Entwicklung der Strommärkte und der Förderung erneuerbarer Energien bei ambitionierten Ausbauzielen – Teilprojekt: Operative Markt- und Förderdesignoptionen
Frank Sensfuß

- Kraftwerkspark und Klimaschutz 2050: Anforderungen an die konventionellen Kraftwerke zur Deckung von Residuallast und Regelleistungsbedarf in Folge des Ausbaus erneuerbarer Energien
Frank Sensfuß

- Langfristpfade für ein klimafreundliches Stromsystem in Europa unter Beachtung des Zusammenspiels verschiedener Dekarbonisierungsoptionen in einem Hoch-Erneuerbaren-System (EU Langfristszenarien 2050 II)
Frank Sensfuß

- Erarbeitung von Vorschlägen für Instrumente zur stärkeren Nutzung von Wärme und Kälte aus erneuerbaren Energien im Gebäudebereich sowie Bearbeitung ausgewählter rechtlicher Fragestellungen in Bezug auf eine Weiterentwicklung des EEWärmeG
Jan Steinbach

- Wissenschaftliche Analyse des Wärme- und Kältemarkts und Vorbereitung des Erfahrungsberichts zum EEWärmeG
Jan Steinbach

ENERGY TECHNOLOGY AND ENERGY SYSTEMS

- Lernende Energieeffizienz- und Klimaschutz-Netzwerke: 30 Pilot-Netzwerke und Entwicklung von Investitionsberechnungshilfen
Harald Bradke

- Energiekonzept der Zukunft
Harald Bradke

- intelligent Zero Emission Urban System – iZEUS
David Dallinger

- Koordination des Themenfelds Nutzerperspektive der Modellregionen Elektromobilität
Elisabeth Dütschke

- Chancen für und Grenzen der Akzeptanz von CCS in Deutschland
Elisabeth Dütschke

- Strategien zum Marktausbau der Elektromobilität in Baden-Württemberg – Elektromoblität im LivingLab BW mobil
Elisabeth Dütschke

- Modeling electricity demand of selected European countries using FORECAST
Tobias Fleiter

- Modeling the European energy demand for space heating in buildings using the bottom-up model FORECAST
Tobias Fleiter

- Entwicklung eines Konzepts zur jährlichen Ermittlung der Förderwirkungen des KfW-Energieeffizienzprogramms
Tobias Fleiter

- Scenarios for long-term electricity demand development in the EU27 countries including Norway, Switzerland and Turkey
Tobias Fleiter

- Modeling energy demand in the iron and steel sector in Taiwan
Tobias Fleiter

- Anforderungen der Integration der Erneuerbaren Energien an die Netzentgeltregulierung
Nele Friedrichsen

- Energietechnologien der Zukunft – Roadmap und F&E-Bedarf
Fabio Genoese

- Energie und Umwelt – Elektromobilität im LivingLab BW mobil
Julia Michaelis

- EnArgus – Zentrales Informationssystem Energieforschungsförderung
Patrick Plötz

- Get e-Ready – Betreibermodell Elektroflotten in Stuttgart
Patrick Plötz

- Beratung bei der Berechnung von Fahrprofilen für alternative Antriebe mit Empfehlung des richtigen Antriebes
Patrick Plötz

- Erstellung von Anwendungsenergiebilanzen für das Verarbeitende Gewerbe
Clemens Rohde

- Policies to enforce the transition to Nearly Zero-Energy buildings in Europe
Clemens Rohde

- EnArgus II – Zentrales Informationssystem Energieforschungsförderung
Clemens Rohde

- Mid-term Evaluation of the European Energy Efficiency Fund
Clemens Rohde

- Entwicklung einer detaillierten Datenbasis zur Bewertung von Energieeffizienzmaßnahmen in der Zeitreihe
Clemens Rohde

- Datenaufnahme Gebäudebestand – Erfassung von statistischen Basisdaten zum Nichtwohngebäudebestand und empirische Analyse der energetischen Qualität ausgewählter Gebäudetypen
Clemens Rohde

- Kosten-/Nutzenanalyse von Instrumenten zur Realisierung von Endenergieeinsparungen in Deutschland im Kontext der (Teil-) Zielerreichung von Artikel 7 der EU-Energieeffizienzrichtlinie
Clemens Rohde

- Preparatory study for industrial steam boilers in the context of the European Ecodesign Process
Clemens Rohde

- Energy Efficient Products Facility
Clemens Rohde

- Regional ECO Mobility 2030 – Systemkonzepte für die urbane Mobilität von morgen
Martin Wietschel

- Weiterentwicklung der Energienachfrageprognose für die EU
Martin Wietschel

- Research School on Energy Scenarios
Martin Wietschel

- Begleitende Akzeptanzstudie zum Projekt eTaxi
Martin Wietschel

- RheinMobil – Grenzüberschreitende deutsch-französische E-Mobilität mit wirtschaftlicher Perspektive
Martin Wietschel

- KIC InnoEnergy: Energy System Analysis Agency (ESA2) – 2013
Martin Wietschel

- Gesamtnutzungskosten von Elektrofahrzeugen und Markthochlaufszenarien
Martin Wietschel

- NEV charging infrastructure with the focus on home charging solutions in China
Martin Wietschel

- PtG-Konzepte mit hoher gesellschaftlicher Akzeptanz für eine effiziente und flexible Speicher- und Energieinfrastruktur zur Integration erneuerbarer Energien in Baden-Württemberg
Martin Wietschel

- Hybride Stadtspeicher
Martin Wietschel

FORESIGHT

• FoodManufuture: Conceptual Design of a Food Manufacturing Research Infrastructure to boost Innovation in the Food Industry
Simon Berner

• ETCETERA: Evaluation of critical and emerging technologies for the elaboration of a security research agenda
Antje Bierwisch

• SIRA: Sicherheit im öffentlichen Raum
Antje Bierwisch

• BJAST: China – Cloud Computing
Kerstin Cuhls

• Foresight-Verlaufssystem
Kerstin Cuhls

• Strategieentwicklung für die Fraunhofer-Allianz Vision
Ewa Dönitz

• ETTIS: European Security Trends and Threats in Society
Ewa Dönitz

• E-MOB: Workshop Elektromobilität
Ewa Dönitz

• RIF: Research and Innovation Futures 2030: From explorative to transformative scenarios
Lorenz Erdmann

• BMBF WAK-MTI: Wandel von Autonomie und Kontrolle durch neue Mensch-Technik-Interaktion
Bruno Gransche

• BMBF-Foresight Zyklus II
Simone Kimpeler

• Monitoring Kultur- und Kreativwirtschaft
Simone Kimpeler

• IEC II: Technology and Market Watch – Nanotechnology in the sectors solar energy and energy storage
Björn Moller

• Molecular Sorting für Ressourceneffizienz
Björn Moller

• EWE-green2store: Durchführung eines Workshops zur Ermittlung von Szenarien der Energieversorgung
Elna Schirrmeister

• Smarter City Roadmap 2015
Elna Schirrmeister

• Zukunftsworkshop Lebensqualität Bad Mergentheim
Elna Schirrmeister

• Zusammenhalt in Deutschland: Konzeption und Moderation eines Prozesses zur Entwicklung von Szenarien zum gesellschaftlichen Zusammenhalt in Deutschland
Elna Schirrmeister

• Ideenmanagement-Prozess KIRCHHOFF Automotive
Benjamin Teufel

INDUSTRIAL AND SERVICE INNOVATIONS

• Clean Sky
Esther Bollhöfer

• RockEU: Robotics Coordination Action for Europe
Annette Braun

• EU_FTE_ROBO: Analysis of the Impact of Robotic Systems on Employment in the European Union
Annette Braun

• DEMAT: Dematerialised Manufacturing Systems: A new way to design, build, use and sell European Machine Tools
Matthias Gotsch

• KrlDe: Kreativität und Innovationsfähigkeit im Demografischen Wandel
Petra Jung Erceg

• DyWaMed: Entwicklung eines simulationsgestützten Werkzeugs zur dynamischen Steuerung der Wandlungsfähigkeit integrierter Wertschöpfungsketten in der Medizintechnik
Oliver Kleine

• Ressourceneffizienz Produktion: Verbundprojekt: Innovationsplattform Ressourceneffizienz in der Produktion, Teilprojekt: Zielgruppenspezifische Aufbereitung und Bündelung der Projektergebnisse sowie Umfeldbeobachtung
Oliver Kleine

• Servicemodelle in der Anlagenindustrie: Unterstützung eines Herstellers von Großanlagen bei der Ausgestaltung avancierter Servicemodelle
Christian Lerch

• INNO-GRIPS-Lot 2: Lot 2 – INNO-GRIPS-Economic and market intelligence on innovation
Oliver Som

• Innovationsfähigkeit KMU in der Metropolregion Stuttgart: Innovationsfähigkeit kleiner und mittlerer Unternehmen des Verarbeitenden Gewerbes in der Metropolregion Stuttgart
Oliver Som

• VITNESS: Veränderungsbereitschaft und interne sowie externe Flexibilität mit nachhaltigen EFQMplus-Konzepten stabilisieren und strategisch in den Geschäftsprozessen implementieren
Oliver Som

• EMS China: Etablierung des European Manufacturing Survey (EMS) in China und Russland
Oliver Som

• Studie GPS: Ganzheitliche Produktionssysteme in der deutschen Wirtschaft: Verbreitung – Typisierung – Bewertung
Christoph Zanker

• Innovationsstrategie Hightech-Industrieunternehmen: Entwicklung einer Innovationsstrategie für ein Unternehmen der Luft- und Raumfahrtindustrie
Christoph Zanker

• DanKETwork: Wissenstransfer über die Folgen und Herausforderungen der Integration von EU-Schlüsseltechnologien (Key Enabling Technologies) in die industrielle Produktion für den Donauraum
Christoph Zanker

• CSSA: Organisatorische Innovation in der Chemiebranche
Christoph Zanker

• INPROWID: Entwicklung und Erprobung eines innovationsorientierten Produktivitätsmesskonzepts für wissensintensive Dienstleister
Christoph Zanker

• SecurePLUGandWORK: Verbundprojekt Intelligente Inbetriebnahme von Maschinen und verketteten Anlagen – Teilprojekt: SecurePLUG andWork von der Automatisierungs- bis zur MES-Ebene
Christoph Zanker

• VDI Verlagerungsanalyse 2012: Analyse des Verlagerungsverhaltens deutscher Unternehmen des Verarbeitenden Gewerbes
Christoph Zanker

• Automotive Südwest: Automotive Engineering Cluster Südwest-Perspektiven und Strategien für die zukünftige Entwicklung
Christoph Zanker

• Investitionsdynamik: Wachstums- und Investitionsdynamik in Deutschland
Christoph Zanker

• GeNaLog-Verbundprojekt: Geräuscharme Nachtlogistik. Geräuscharme Logistikdienstleistungen für Innenstädte durch den Einsatz von Elektromobilität, Sozioökonomische, verkehrs- und handelslogistische Konzeption der geräuscharmen Belieferung
Christoph Zanker

• Balanced-GPS: Verbundvorhaben Ganzheitliche Produktionssysteme mit stabil-flexiblen Standards und konsequenter Mitarbeiterorientierung
Christoph Zanker

• E-mobil BW Clusterbenchmarking: Erarbeitung eines internationalen Benchmarkings des Clusters Elektromobilität Süd-West
Christoph Zanker

PROJECTS

SUSTAINABILITY AND INFRASTRUCTURE SYSTEMS

• NTM: Wirtschaftliche Aspekte nichttechnischer Maßnahmen zur Emissionsminderung im Verkehr
Claus Doll

• MOWE-IT: Managing Weather Extremes in Transport
Claus Doll

• LivingRAIL: Living in a Sustainable World based on Electrified Rail
Claus Doll

• Transport & Environment
Claus Doll

• Infrastructure and External Costs of Long Vehicles
Claus Doll

• Finanzierung einer nachhaltigen Güterverkehrsinfrastruktur
Claus Doll

• Economic perspectives on international transfer of climate technologies to newly industrializing and developing economies (MERIT)
Carsten Gandenberger

• Entwicklung von Politikempfehlungen für die Weiterentwicklung und Ausgestaltung von strategischen Ansätzen einer nachhaltigen und effizienten Rohstoffgewinnung und -nutzung (RohPolRess)
Carsten Gandenberger

• Vergleichsstudie verschiedener Prüfsiegel, Labels und Bewertungssysteme im IKT-Bereich
Carsten Gandenberger

• InWasif: Zukunftsfähiges integriertes Wasserinfrastruktur- und Nutzungskonzept für Stadtquartiere
Harald Hiessl / Thomas Hillenbrand

• Schutz-TW: Schutz der Trinkwasserversorgung vor Anschlägen mit CBRN-Stoffen – Technik und Strategieentwicklung / Teilvorhaben 5: Sozioökonomische Ansätze zur Bewertung und Kommunikation von Maßnahmen zur Verbesserung der Sicherheit der Wasserversorgung
Harald Hiessl / Felix Tettenborn

• TWIST++: Transitionswege WasserInfraSTruktursysteme: Anpassung an neue Herausforderungen im städtischen und ländlichen Raum
Thomas Hillenbrand

• Weg nachhaltige WaWi: Auf dem Weg zu einer nachhaltigen Wasserwirtschaft
Thomas Hillenbrand

• LUWOGE-WISKO-Wohnungsbau: Innovative Wasserinfrastrukturkonzepte im Wohnungsbau – Untersuchung von Anwendungspotenzialen
Thomas Hillenbrand

• UBA-Mikroschadstoffe: Wirksamkeit und Kosteneffizienz von produktbezogenen und nachgeschalteten Maßnahmen zur Verminderung des Eintrages von Mikroschadstoffen in die Gewässer
Thomas Hillenbrand

• Prio IV: Leitlinie für die Bestandsaufnahme gefährlicher Stoffe
Thomas Hillenbrand

• z*dez-Phase 3: Zentraler Betrieb dezentraler Anlagen – Umsetzung eines innovativen Organisationskonzepts zur Abwasserentsorgung mittels Kläranlagen in Baden-Württemberg, Anwendungsgebiet Landkreis Ravensburg
Thomas Hillenbrand

• Wasserinfrastruktur NRW: Finanzierbare Zukunftsoptionen für die kommunale Wasserinfrastruktur in NRW
Thomas Hillenbrand

• Smart Cities Stakeholder Platform
Stefan Klug

• PACT: Pathways for Carbon Transitions
Jonathan Köhler

• GLOBIS: Globalisation Informed by Sustainable Development
Jonathan Köhler

• Market-up: Market uptake of transport research and role of actors and regions
Jonathan Köhler

• Fallstudie bezüglich der Ausgestaltung und Anwendung eines marktbasierten Instruments zur Reduktion von Treibhausgas-Emissionen in der internationalen Seeschifffahrt
Jonathan Köhler

• Vermeidung von nachteiligen Effekten einer regionalen marktbasierten Maßnahme in der Seeschifffahrt
Jonathan Köhler

• TRI-VALUE-Support: Ex-post evaluation of the transport (including AAT) theme of the FP7 Cooperation specific programme
Jonathan Köhler

• Future: Future prospects on transport evolution and innovation challenges for the competitiveness of Europe
Michael Krail

• ASSIST: Assessing the social and economic impacts of past and future sustainable transport policy
Michael Krail

• Recycling von Komponenten und strategischen Metallen aus elektrischen Fahrantrieben
Frank Marscheider-Weidemann

• IKU Innovationspreis für Klima und Umwelt für die Jahre 2011 bis 2013
Frank Marscheider-Weidemann

• Weiterentwicklung der abfallwirtschaftlichen Produktverantwortung unter Ressourcenschutzaspekten am Beispiel von Elektro- und Elektronikgeräten
Frank Marscheider-Weidemann

• Ermittlung von Substitutionspotentialen von primären strategischen Metallen durch Sekundärmaterialien
Frank Marscheider-Weidemann

• ProLignocel – Neue nachhaltige Prozesse zur ganzheitlichen Verwertung und Materialentwicklung aus Lignocellulose
Frank Marscheider-Weidemann

• Nachhaltigkeitsberichterstattung
Frank Marscheider-Weidemann

• CapChemRU 2: Dialogue among stakeholders
Eve Menger-Krug

• Development of concepts and methods for compilation and assessment of selected anthropogenic pressures in the context of the Marine Strategy Framework Directive
Jutta Niederste-Hollenberg

• Kö-Bogen Düsseldorf, Plausibilitätsprüfung des Energiekonzepts
Jutta Niederste-Hollenberg

• RISA – integrierte Szenarien für Hamburg
Jutta Niederste-Hollenberg

• r²: Innovative Technologien für Ressourceneffizienz – Integrations- und Transferprojekt
Katrin Ostertag

• Wirtschaftsfaktor Umweltschutz: Analyse der wirtschaftlichen Bedeutung des Umweltschutzes durch Aktualisierung und Auswertung wichtiger Kenngrößen
Katrin Ostertag

• Decarbonize – Climate protection through decarbonization of German industries
Katrin Ostertag

• Innovationsorientierte Beschaffung
Katrin Ostertag

• ÖkonRess – Entwicklung von Vorschlägen zum Einsatz von ökonomischen Instrumenten zur Steigerung der Ressourceneffizienz in Deutschland und der EU
Katrin Ostertag

- REBOUND: Die soziale Dimension des Rebound-Effekts
Anja Peters

- Recherche, Überblick und Bewertung von Marktforschungsstudien zur Kundenperspektive
Anja Peters

- Rebound Effect – Empirische Analyse von Rebound-Effekten und Folgerungen für die Gestaltung des umweltpolitischen Instrumentariums
Anja Peters

- NRW-Umwelttechnologiecluster: Bereitstellung eines Clustermanagements für die Entwicklung des Clusters NRW.Umwelttechnologien
Christian Sartorius

- Ökologische Modernisierung der Wirtschaft durch eine moderne Umweltpolitik
Christian Sartorius

- APRAISE: Assessment of Policy Interrelationships and Impacts on Sustainability in Europe
Christian Sartorius

- DeteRess: Strukturelle und produktionstechnische Determinanten der Ressourceneffizienz: Untersuchung von Pfadabhängigkeiten, strukturellen Effekten und technischen Restriktionen auf die zukünftige Entwicklung der Rohstoffproduktivität
Christian Sartorius

- Zukunft der Automobilindustrie
Wolfgang Schade

- TEN-T Large Projects: Investments and Costs
Wolfgang Schade

- The Orientations and Policies of Interurban Transport in the Outermost Regions
Wolfgang Schade

- Innovationsnetzwerk Morgenstadt City Insights (M:ci)
Wolfgang Schade

- RENEWBILITY-II: Stoffstromanalyse nachhaltiger Mobilität im Kontext Erneuerbarer Energien
Wolfgang Schade

- Development of a global copper flow model
Luis Tercero Espinoza

- r³ – InTra: Innovative Technologien für Ressourceneffizienz – Strategische Metalle und Mineralien
Luis Tercero Espinoza

- Critical Raw Materials Innovation Network – Towards an integrated community driving innovation in the field of critical raw material substitution for the benefit of EU industry
Luis Tercero Espinoza

- Study on Critical Raw Materials at EU Level
Luis Tercero Espinoza

- European Intelligence Network on the Supply of Raw Materials
Luis Tercero Espinoza

- HAPPI: Small Hydropower Plants: Assessment of Climate Protection Potential and Improvement by Smart Technologies
Felix Tettenborn

- Indirekteinleiter – Abschätzung der Auswirkung eines Verzichts einer spezifischen Vorbehandlung bei Indirekteinleitern – Argumentationshilfe im Kontext der IE-Richtlinie
Felix Tettenborn

- Maßnahmeneffizienz – Effizienz von Maßnahmen zur Reduktion von Stoffeinträgen
Felix Tettenborn

- Lead-Market-Strategien: First Mover, Early Follower und Late Follower, Teilvorhaben Lead-Market-Strategien und Systemdynamik
Rainer Walz

- Systemische Risiken: Analyse der Vulnerabilität von Elektrizitätsversorgungsystemen mit unterschiedlich ausgeprägter Integration Erneuerbarer Energien
Rainer Walz

EMERGING TECHNOLOGIES

- Gigabitgesellschaft
Bernd Beckert

- ESF Material Science
Bernd Beckert

- TAB Gesundheitswesen: Technischer Fortschritt im Gesundheitswesen
Tanja Bratan

- SONIA: Soziale Inklusion durch technikgestützte Kommunikationsangebote im Stadt-Land-Vergleich
Tanja Bratan

- Begleitforschung auf dem Gebiet Mobile Diagnostiksysteme
Tanja Bratan

- PRESCIENT: Privacy and Emerging Sciences and Technologies
Michael Friedewald

- SAPIENT: Supporting fundamental rights, privacy and ethics in surveillance technologies
Michael Friedewald

- MARS: Mobile Authentifizierung mittels Retina Scan
Michael Friedewald

- PRISMS: PRIvacy and Security MirrorS
Michael Friedewald

- IRISS: Increasing Resilience in Surveillance Societies
Michael Friedewald

- TRi-Gen: Translational research in genomic medicine: Institutional and social aspects
Bärbel Hüsing

- Zellfreie Bioproduktion – Etablierung einer Bioproduktionsanlage für die zellfreie Proteinsynthese mit integrierter Energieversorgung – Biomoleküle vom Band
Bärbel Hüsing

- TAB – Weiße BT: Innovationsreport Weiße Biotechnologie – Stand und Perspektiven der Industriellen Biotechnologie für nachhaltiges Wirtschaften
Bärbel Hüsing

- Fraunhofer-Systemforschung: Basismodul für die zellfreie Bioproduktion „Die Industriezelle"
Bärbel Hüsing

- STOA – Potentials and Impacts of Cloud Computing Services and Social Network Sites
Timo Leimbach

- ETTIS: European Trends and Threats in Society
Timo Leimbach

- IT2Green: Evaluation, wissenschaftliche Begleitung und Ergebnistransfer der Maßnahme IT2Green – Energieeffiziente IKT für den Mittelstand, Verwaltung und Wohnen
Timo Leimbach

- Software-Atlas 2013
Timo Leimbach

- Softwarecluster-Benchmark 2013
Timo Leimbach

- Big Data in der Cloud (TA-Vorstudie)
Timo Leimbach

- SF-Policy-Instrumente: Strategiefondsprojekt Forschungsklausur Policy-Analyse am Fraunhofer ISI
Ralf Lindner

- Res-AGorA: Responsible Research and Innovation in a Distributed Anticipatory Governance Frame. A Constructive Socio-normative Approach
Ralf Lindner

- Das Konzept Responsible Research and Innovation und dessen Relevanz für die deutsche Forschungs-, Technologie- und Innovationspolitik (TA-Vorstudie)
Ralf Lindner

- MetaForum
Thomas Reiß

- ERACEP: Emerging Research Areas and their Coverage by ERC-supported Projects
Thomas Reiß

- ETEPS: European techno-economic policy support network
Thomas Reiß

- ManETEI: Management of emergent technologies for economic impact
Thomas Reiß

- SynBio-Fallstudien: Synthetische Biologie Fallstudien
Thomas Reiß

- SynBio-Patentrecherche: Synthetische Biologie Patentrecherche
Thomas Reiß

- Hightech Los 2: Begleitforschung der Hightech-Strategie – Analyse zu ausgewählten Aspekten. Los 2: Rahmenbedingungen
Thomas Reiß

- EMOTOR: EnergiespeicherMOniTORing für die Elektromobilität
Thomas Reiß

- HBS Gesundheitssystem: Analyse des Gesundheitswesens aus Innovationssystemperspektive
Thomas Reiß

- BioBias: Thematische Schwerpunktbildung in den Life Sciences durch systemimmanente Prozesse
Thomas Reiß

- Gesundheit 2013
Thomas Reiß

- Gesundheitsregionen der Zukunft
Thomas Reiß

- Integrated EST Framework (EST-Frame)
Thomas Reiß

- ROcKETs: Methodology, Work plan and roadmap for cross-cutting KETs' activities in Horizon 2020
Thomas Reiß

- EU Knights
Thomas Reiß

- KIC InnoEnergy ESA2 PHD 2013
Andreas Sauer

- LIB2015: LIB2015-Roadmapping (Innovationsallianz Lithium-Ionen-Batterie)
Axel Thielmann

- Leichtbau Marktstudie
Axel Thielmann

- Preparation and demonstration of multi-KETs' pilot lines actions
Axel Thielmann

- Biotechnologie in Bayern
Sven Wydra

- Key Enabling Technologies (KETs) Observatory
Sven Wydra

- Forum Privatheit und selbstbestimmtes Leben in der digitalen Welt
Peter Zoche

- Fachdialog Sicherheitsforschung
Peter Zoche

- Future Urban Security BW
Peter Zoche

- Privacy Dialog
Peter Zoche

- Barometer Sicherheit in Deutschland BaSiD
Peter Zoche

POLICY AND REGIONS

- Erstellung eines Druckberichtes auf Basis der Daten der aktualisierten Fassung der Landkarte Hochschulmedizin (2009–2012)
Susanne Bührer

- Begleitende Evaluierung zum Impulsprogramm Laura Bassi Centres of Expertise
Susanne Bührer

- Governance frameworks for Responsible Research and Innovation (RRI)
Stephanie Daimer

- Forward Visions on the European Research Area
Stephanie Daimer

- Research and Innovation cooperation between EU and China
Cheng Fan

- Verbundvorhaben: Aufbau eines bibliometrischen Kompetenzzentrums für die deutsche Wissenschaft – Durchführung des Teilvorhabens: Erwartete Zitate und Klassifikation sowie vollständige Erfassung von Patentanmeldungen aus Universitäten (mit Promotionsförderung)
Rainer Frietsch

- Publikationen und Patente in der Universitätsmedizin
Rainer Frietsch

- Ergebnisse von öffentlicher und privater Forschung: Publikationen
Rainer Frietsch

- Mitwirkung an der Deutsch-Chinesischen Plattform Innovation
Rainer Frietsch

- Marie Curie researchers and their long-term career development
Rainer Frietsch

- Bibliometrische Analyse des Projektes zur Evaluation der BMBF-Programme GLOWA und BIOLOG
Rainer Frietsch

- Strategische Ausrichtung der wissenschaftlichen und industriellen Forschung in Baden-Württemberg
Rainer Frietsch

- Indikatorensystem zur technologischen Leistungsfähigkeit Deutschlands – Ergebnisse von öffentlicher und privater Forschung: Fachpublikationen
Rainer Frietsch

- Identifikation der Technologieprofile von FuE-betreibenden Unternehmen anhand eines Matchings von FuE- und Patentdaten
Rainer Frietsch

- Erfassung bibliometrischer Indikatoren von Universitäten
Rainer Frietsch

- Ökonomische Analyse der Bedarfsfelder der Hightech-Strategie – Los 1
Rainer Frietsch

- Innovationsindikator Deutschland
Rainer Frietsch

- Entwicklung und Erprobung eines innovationsorientierten Produktivitätsmesskonzepts für wissensintensive Dienstleister
Rainer Frietsch

- Forschungscampus – pro aktiv. Erfahrungsaustausch und Integration im Rahmen der Förderinitiative Forschungscampus – öffentlich-private Partnerschaft für Innovation
Knut Koschatzky

- Conceptual design of a food manufacturing research infrastructure to boost innovation in food industry
Knut Koschatzky

- Begleitende Evaluierung der Fördermaßnahme Validierung des Innovationspotenzials wissenschaftlicher Forschung – VIP
Knut Koschatzky

- Regionale Netzwerkbeteiligungen und ihre Auswirkungen auf die internen Governancestrukturen von Hochschulen
Knut Koschatzky

- Research Project for BRCSS Technology Transfer
Henning Kroll

- Regional Innovation Monitor 2013–2014 – RIM Plus
Henning Kroll

- Joint Project on Developing Proposals for Foshan New City Industrial Services Demonstration Area
Henning Kroll

- Supporting Research for the BRCSS Project Demand for Technology Transfer
Henning Kroll

- Erfolgskontrolle des Programms SIGNO – Schutz von Ideen für die Gewerbliche Nutzung des Bundesministeriums für Wirtschaft und Technologie
Marianne Kulicke

• Wissenschaftliche Begleitung und Evaluation des BMWi-Programms Existenzgründungen aus der Wissenschaft (EXIST)
Marianne Kulicke

• Wirtschaftlichkeit der Erweiterung der Antragsberechtigung auf Unternehmen bis zu 500 Beschäftigten bei im Rahmen des Zentralen Innovationsprogramms Mittelstand (ZIM) geförderten Projekten
Marianne Kulicke

• The potential knowledge divides among Member States as a consequence of the simultaneous implementation of major EU policies, including Horizon 2020
Niclas Meyer

• Impact Evaluation – Erwin Schrödinger Fellowships with Return Phase
Niclas Meyer

• The challenge of globalization: Technology Driven Foreign Investment (TFDI) and its Implications for the Negotiation of International (bi and multilateral) Investment Agreements
Niclas Meyer

• Zentrales Informationssystem Energieforschungsförderung – Projektantrag zum 6. Energieforschungsprogramm
Carolin Michels

• Zentrales Informationssystem Energieforschungsförderung
Carolin Michels

• Ergebnisse von öffentlicher und privater Forschung: Patente
Peter Neuhäusler

• Indikatorensystem zur technologischen Leistungsfähigkeit Deutschlands – Ergebnisse von öffentlicher und privater Forschung: Patente – Patente
Peter Neuhäusler

• Erfassung bibliometrischer Indikatoren für die PFI-Monitoringberichte 2011–2015
Ulrich Schmoch

• Erhebung des Innovationsverhaltens der Unternehmen in der produzierenden Industrie und in ausgewählten Dienstleistungssektoren in Deutschland in den Erhebungsjahren 2013, 2014, 2015 und 2016
Torben Schubert

• Regionaler Wirtschaftsfaktor Hochschule
Torben Schubert

• Erarbeitung eines internationalen Benchmarkings des Clusters Elektromobilität Süd-West
Thomas Stahlecker

• Die Internationalisierung unternehmerischer Forschung und Entwicklung im IHK-Bezirk Karlsruhe – Aktuelle Situation und zukünftige Herausforderungen
Thomas Stahlecker

• Zukunftsstrategien Arbeitsmedizinermangel
Thomas Stahlecker

• Richtlinie zur Förderung eines Begleitforschungsvorhabens zum BMBF-Wettbewerb Gesundheitsregionen der Zukunft
Thomas Stahlecker

• Establishment of a European Service Innovation Centre
Andrea Zenker

• Publikationsvorhaben: Strategies for bilateral research co-operations: German-French experience in applied research
Andrea Zenker

• Pilotstandort Elsass für die Fraunhofer-Gesellschaft
Andrea Zenker

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