

# Thinking and researching in networks

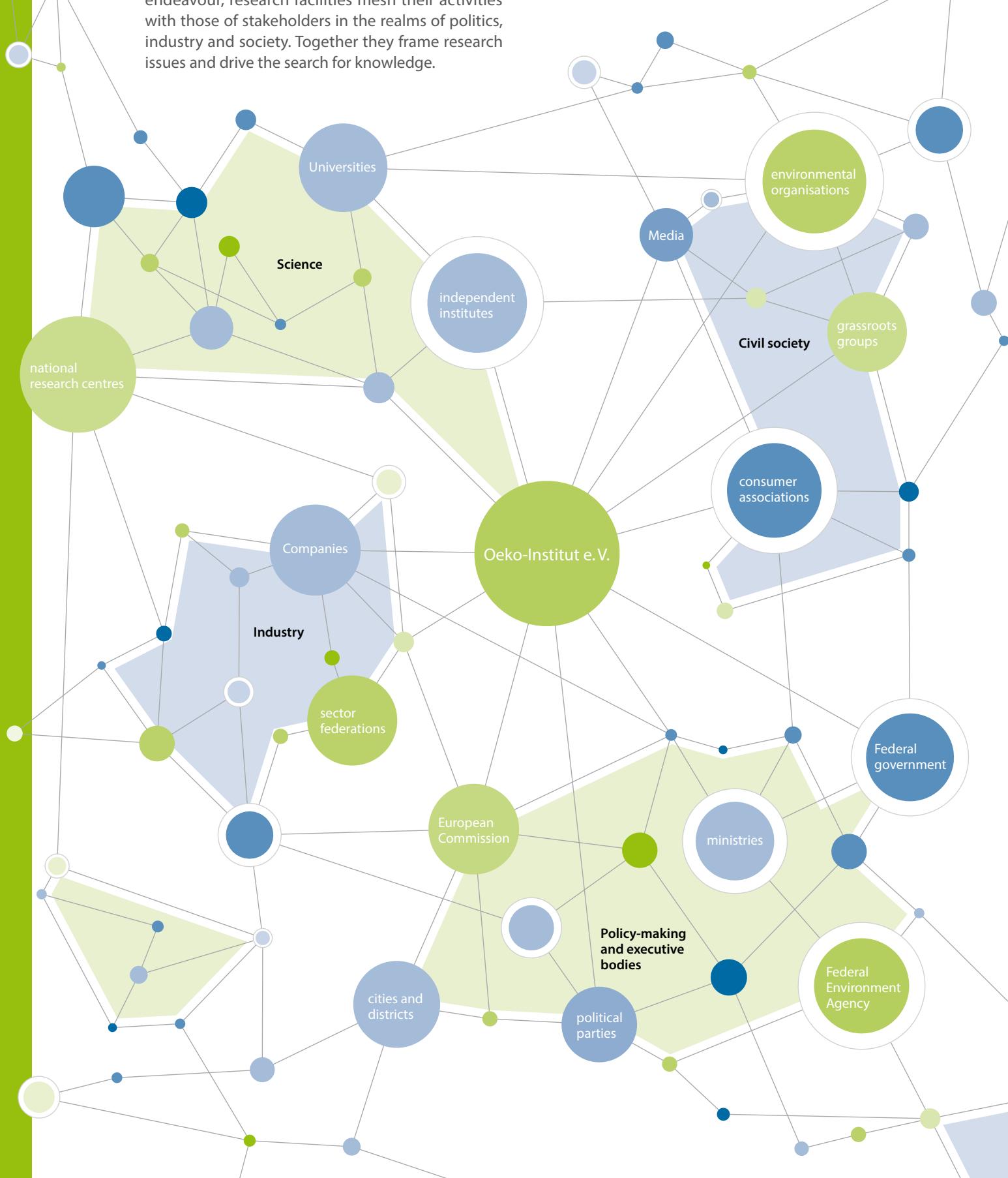
Annual report of the Oeko-Institut 2012



# Sustainability needs joint action!

The ultimate purpose of research for sustainability is to put policies on track to achieve environmental quality while mitigating climate change. This is vital in Germany, in Europe and worldwide. Towards that endeavour, research facilities mesh their activities with those of stakeholders in the realms of politics, industry and society. Together they frame research issues and drive the search for knowledge.

The Oeko-Institut draws on 35 years of experience in transdisciplinary research. This annual report for 2012 presents our work and our understanding of cross-cutting science for sustainable development.



# Contents

# Impressum

<b>Our year 2012</b>	<b>4</b>
Editorial by Michael Sailer, Chief Executive Officer of the Oeko-Institut	
<b>Transdisciplinary sustainability research</b>	<b>6</b>
at the Oeko-Institut	
<b>Working at the Oeko-Institut</b>	<b>7</b>
Trends in 2012	
<b>A fresh perspective – Selected projects 2012</b>	<b>8</b>
<b>Multiple facets, many questions</b>	<b>9</b>
Challenges of the energy transition	
<b>Climate performance in transport</b>	<b>10</b>
Mitigation potential to 2030	
<b>Better data – but not only</b>	<b>11</b>
Second step in the REACH Baseline Study	
<b>Resource conservation and accessibility</b>	<b>12</b>
A sustainability matrix for Deutsche Telekom	
<b>Appraising underground structures</b>	<b>13</b>
Spatial planning beneath the surface	
<b>More nano in REACH!</b>	<b>14</b>
Improving nanomaterial disclosure	
<b>Round table talks</b>	<b>15</b>
Providing expertise for reconciliation	
<b>Cooperation and coordination</b>	<b>16</b>
The EU renewables directive	
<b>Safety status: poor</b>	<b>17</b>
Fessenheim and Beznau reactors under scrutiny	
<b>When is recovery worthwhile?</b>	<b>18</b>
Recycling lithium-ion batteries	
<b>Alliances for sustainability</b>	<b>19</b>
The Oeko-Institut's clients	
<b>Fresh thought, meshed work</b>	<b>20</b>
The Oeko-Institut's internal constitution	
<b>Communicating science</b>	<b>22</b>
<b>Networks in society</b>	<b>23</b>



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Edited by:  
Mandy Schoßig (verantwortlich), Karin Menge  
Christiane Weihe ([www.wortspektrum.de](http://www.wortspektrum.de))

Translation:  
Christopher Hay

Oeko-Institut, Berlin office  
Schickler Straße 5-7  
10179 Berlin  
[redaktion@oeko.de](mailto:redaktion@oeko.de)  
[www.oeko.de](http://www.oeko.de)

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# Our year 2012

Dear reader,

The 2012 Year of Science "Creating a Future for Planet Earth" (Zukunftsprojekt Erde) was timely indeed.

The transition to sustainable energy systems is a hot topic, in Germany as elsewhere. The paths pursued by various stakeholder groups to produce and use low-carbon, sustainable energy diverge widely. The promotion of renewable sources – whether by means of the Renewable Energies Act (Erneuerbare-Energien-Gesetz: EEG), which has been in place in Germany for some time now, or through other instruments – is key. The envisaged phase-out of nuclear power, which gained fresh momentum after the events in Fukushima, makes it all the more urgent to tackle the issues surrounding nuclear repositories. Many more of our research interests – such as deploying electromobility as an option within the overall mobility mix, harnessing novel potential in future resource policy, and making our consumption patterns more sustainable – were more topical than ever in the 2012 Year of Science, with its focus on sustainability.

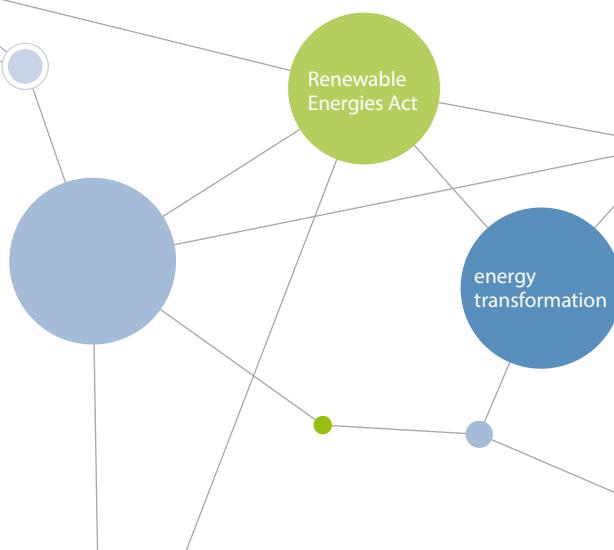
## Transdisciplinary approaches at the Oeko-Institut: Challenges tackled ...

Over the past year, the Oeko-Institut has engaged closely with these and many other issues. Our work is guided by the conviction that a more sustainable way of life, in all its facets, can be brought about only if science, society and industry join forces. This means that all of us bear responsibility in the quest to achieve sustainability. For us, as a research institute, it also means that we must involve diverse stakeholders – businesses, politicians, private-sector associations, civil-society groups – from the very outset in the process of generating scientific findings. In academic jar-

gon, such an approach is termed "transdisciplinary research". In practical terms, it means, firstly, creating the foundations in the natural, social and economic sciences by which to develop and refine scientific ideas and concepts. It additionally means engaging in cooperation that breaches the confines of individual disciplines and working together with the stakeholders who have assembled a wealth of experience and knowledge outside the science system as such.

## ... and experience gathered over more than 35 years

At the Oeko-Institut we have a long history of cooperation with such stakeholders. It is not always an easy path to travel. The issues are hugely diverse: in the 1980s, we were involved in founding the first energy transition committees; for many years, we facilitated the regional Frankfurt Airport dialogue forum; one of our current commissions is to mediate disputes over two planned pumped-storage hydropower plants. Engaging in dialogue and transferring the outcomes of such exchanges into policy recommendations that simultaneously meet strict scientific criteria is important today – it will be vital tomorrow to cope with the major challenges ahead. We need to catch up on much that has been neglected, particularly with regard to the huge infrastructural shifts that will be essential for energy system transformation to succeed. Striking a balance between scientific-technical criteria, methodical procedures and the involvement of diverse public stakeholders will be fundamental. Simulation models will not suffice. We need paths that are truly viable and are travelled.



## Initial successes and a look to the future

There have been successes to celebrate in 2013: for one thing, it is now beyond dispute that we must reconfigure our energy systems. That we can do this without nuclear power is something we at the Oeko-Institut have known for long. The precise way to address these and other challenges remains a source of controversy, however.

The programmatic title of our 2012 Annual Conference was: "Energiewende – Well networked?" The question mark was not without reason: How precisely to expand energy networks? What type of public support will be suitable for renewables in future? How do markets need to be configured in response to the new demands that will arise? These were just some of the questions we explored together with a panel of eminent individuals who will be deciding policies and shaping processes in the political, industrial and civil-society arenas.

The present annual report for 2012 takes stock and provides insights into ten of the Oeko-Institut's lighthouse projects. We have selected some which have "only" deployed classic scientific methods, and others in which we felt that more promising results would be achieved if we employ additional, transdisciplinary approaches. Be that as it may, our work is always guided by the quest for the best practicable solution in pursuit of sustainable development.

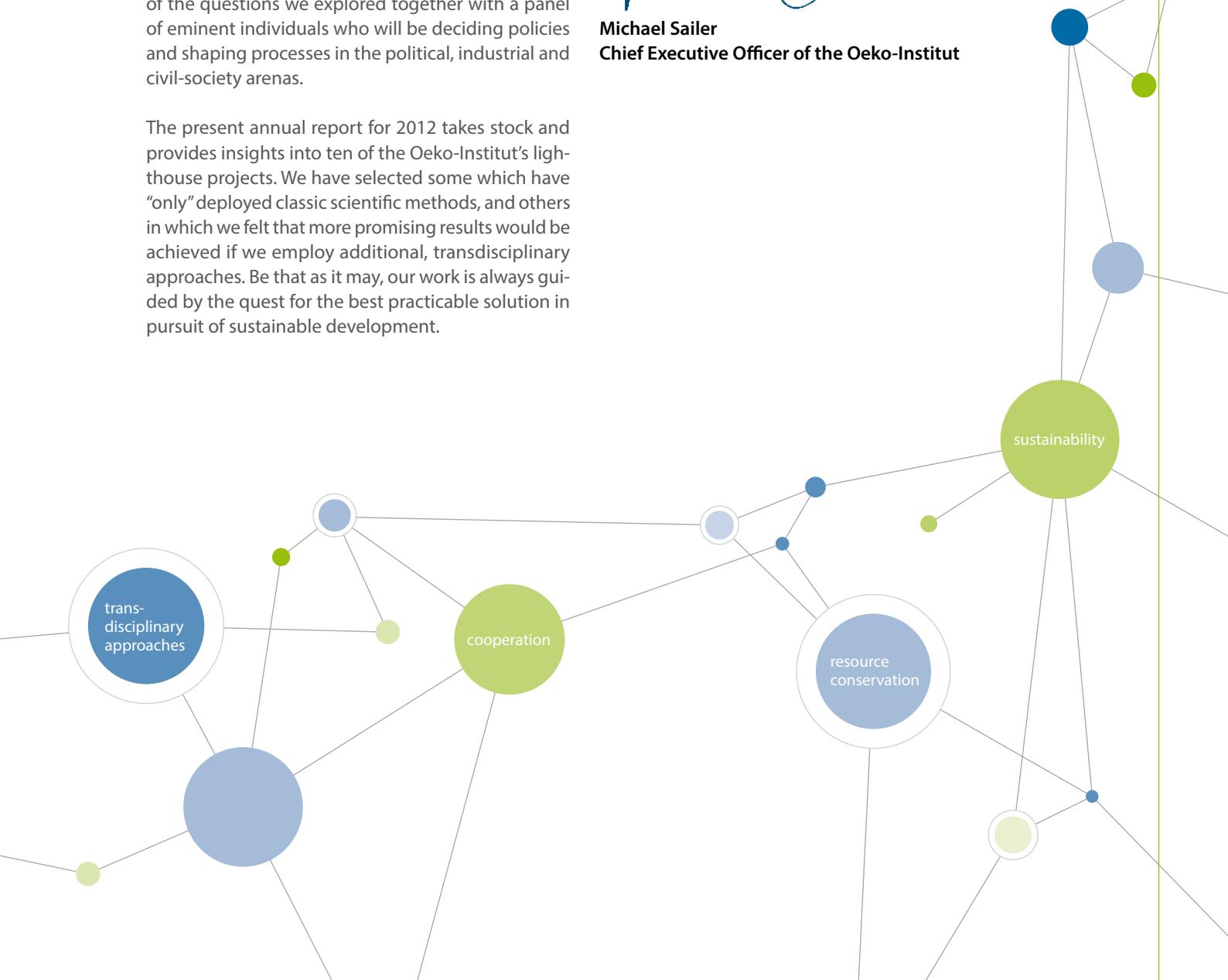
We will maintain that vision in 2013. Past issues will remain prominent. But these will be joined by novel priorities, large and small: What contribution does waste prevention make to resource conservation? What demands does energy system transformation place upon spatial planning – both above and below ground? How can a high-profile event such as the state garden festival due to be held in Lahr in 2018 be organised in a sustainable manner? How can, at societal level, the essential transition towards sustainability be configured overall?

I hope you enjoy reading our annual report for 2012.

**Your**



**Michael Sailer**  
**Chief Executive Officer of the Oeko-Institut**



# Transdisciplinary sustainability research = Science + Society

**Over the last 35 years the Oeko-Institut has been one of the leading independent research institutes working on how to create a sustainable future. The outcomes of this work include robust scientific analyses and strategies that contribute towards resolving issues to do with environmental protection, resource conservation, climate change mitigation and many other fields. The aim is to help policy-makers, business managers, mediators in civil society organisations and indeed private individuals to make decisions that take equal account of the well-being of human society, the natural environment and the climate system.**

When addressing our research questions and objectives we are always keen to remain in close touch with what is going on in society, as we believe many actors have gathered valuable experience in the course of restructuring our energy supply sustainably, using

scarce natural resources prudently and consuming goods and food in an environmentally sound way. Incorporating this experience into the process of generating scientific knowledge is at the heart of transdisciplinary sustainability research. Overcoming disciplinary boundaries and enabling actors outside the scientific system to have a say – these are the premises on which many of the Oeko-Institut's projects have been based since its inception. We present some of these projects to you in our Project Highlights section from page 9.

Oeko-Institut scientists also collaborate in networks. Their aim is to extend the knowledge base for a sustainable future and to develop recommendations capable of being put into practice in the realms of politics, economics and society. Alongside our membership in Ecornet we have participated actively in two other initiatives in 2012.

## Ecornet – Ecological Research Network

The Oeko-Institut has been a member of Ecornet, a network of non-university, not-for-profit environmental and sustainability research institutes in Germany, since 2011. The institutes in Ecornet are striving to establish the scientific foundations for society's transformation towards sustainability. Together they have lent support to the 2012 Year of Science "Creating a Future for Planet Earth" (Zukunftsprojekt Erde) in the form of discussion sessions. They will continue to develop the methods for this transdisciplinary work into the future.

[www.ecornet.de](http://www.ecornet.de)

## NaWis – Alliance for Sustainable Science

The Alliance for Sustainable Science (Verbund für Nachhaltige Wissenschaft, NaWis) also brings together scientific institutions to work on developing and promoting transdisciplinary scientific research on sustainability. The NaWis alliance is chiefly concerned with discussing and researching the challenges posed by climate change and environmental degradation beyond disciplinary boundaries and to draw attention to them at public events. During the 2012 Year of Science the Oeko-Institut participated in numerous events and ran its annual energy transition conference under the auspices of NaWis.

[nachhaltigewissenschaft.blog.de](http://nachhaltigewissenschaft.blog.de)

## Memorandum for the Promotion of Socio-Ecological Research

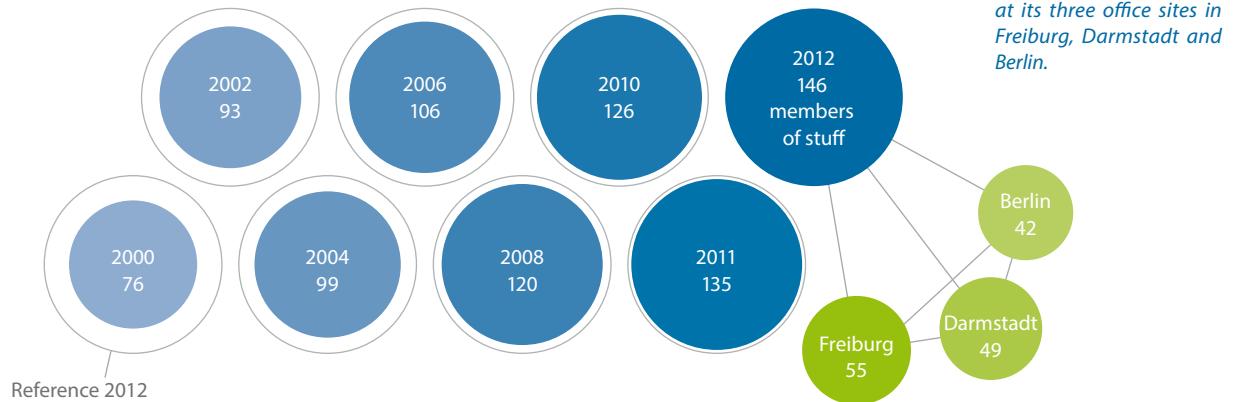
Key actors in transdisciplinary sustainability research, including the Oeko-Institut, have put forward a memorandum for the promotion of socio-ecological research. The memorandum seeks to ensure that such research is consistently intensified and broadened over the coming years in terms of content, organisation and institutional participation. So far more than 1000 people have signed the appeal, which is to be handed to the German government's Minister for Research.

[www.sozial-okeologische-forschung.org](http://www.sozial-okeologische-forschung.org)

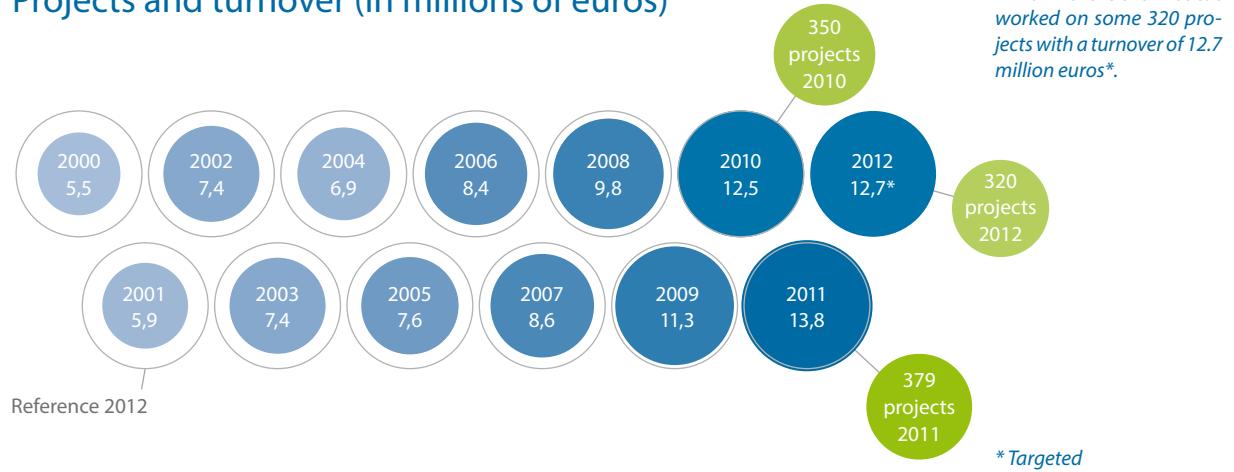
For a complete overview of the Oeko-Institut's involvement in research bodies and networks, see our website at [www.oeko.de/netzwerke](http://www.oeko.de/netzwerke)

# Working at the Oeko-Institut: Trends in 2012

## Staff



## Projects and turnover (in millions of euros)



## The Oeko-Institut as employer

We are keen to ensure that all members of our staff are able to combine family and work commitments in the best way possible. To achieve this we generally offer jobs that can be done part time with a range of options for organising weekly working hours. In 2012, 57 percent of our colleagues worked part time. Roughly half of our research staff are women. In addition, the Oeko-Institut in Freiburg is a member of the Freiburg-based "Family-Friendly Companies" network which, besides exchanging information and views, provides opportunities for jointly developing family-friendly projects.

Just as important to us is the task of offering our staff opportunities for further training and education and supporting them in their personal and professional development. We make use of a range of staff development tools for this purpose, which we are constantly expanding and upgrading.

# A fresh perspective

## Selected projects from 2012

It is often helpful – whether in personal conversation or work projects – to get a different perspective on things: other people's experience and knowledge can be instructive and beneficial for our own thinking and acting. This is true of scientific work as well. That is why transdisciplinary sustainability research has been a firm fixture at the Oeko-Institut for many years. On the following pages we present ten projects we have been working on over the past year – including transdisciplinary research studies.

In 2012 more than 320 projects formed the focus of the Oeko-Institut's scientific work. All five specialist divisions of the institute also devoted time and effort to transdisciplinary research on sustainability. One example is a project dealing with marine litter in the Infrastructure & Enterprises Division; another is the IPPA project in the Nuclear Engineering & Facility Safety Division, which deals with public participation in the search for nuclear waste repository sites in Central and Eastern Europe. A transdisciplinary approach has also been adopted by the Sustainable Products & Material Flows Division in the TA-SWISS study on nanomaterials and by the Energy & Climate Division in the context of the RES4LESS project.

We would now like to present to you both these and other projects involving transdisciplinary sustainability research. Relevant stakeholders have been involved in the research programme Renewbility II, for example, as they have also been in the development of a method for assessing sustainability. Reconciling disparate interests is central to the Round Table for the Hessian region of Ried.

However, we also want to present some of our studies that are not transdisciplinary in nature. For example, our scientists have been taking a close look at the energy transition and at instruments suitable for furthering the use of renewable energies. They have assessed the safety status of nuclear plants, probed underground spatial planning, and produced life-cycle assessments for lithium-ion battery recycling processes. The Oeko-Institut has also been working intensively over the past year on the European chemicals regulation REACH.

Coming up with solutions together – this is the principle that applies in all our projects, transdisciplinary or otherwise. Incorporating a variety of perspectives as well as engaging intensively in an exchange of views and information with colleagues, partners and members, clients, friends and supporters has always been something that has inspired our work and helped us move forward. And it will continue to do so in the future.



# Multiple facets, many questions

## The challenges posed by the energy transition

**Whether we are looking at the withdrawal from nuclear energy or the expansion of the energy infrastructure – the energy transition is a key issue at the Oeko-Institut. In 2012 our scientists have continued, in a variety of projects, to look at ways of restructuring our energy system so that it is sustainable and resilient. The key issues within this were ways of financing the energy transition and developing robust market-based mechanisms.**

In autumn 2012 it was announced that the renewable energy surcharge (based on the Renewable Energies Act or Erneuerbare-Energien-Gesetz: EEG) will increase in 2013, and this has sparked widespread debate about trends in electricity pricing and the costs of the energy transition. The Oeko-Institut produced two concise analyses in this connection. In a study on the EEG surcharge, Oeko-Institut experts elucidated the key reasons for the increase: only 44 percent of it is due to the continued expansion of renewable energy in 2013; the majority has been caused by other factors, including in 2012 low wholesale energy prices, the extension of financial privileges to industry stakeholders, and the enlargement of the financial safety buffer for the EEG account. Our energy transition costs index (Energiewende-Kosten-Index: EKX) project also looked at the factors that influence electricity pricing. It showed, among other things, that 54 percent of the price rises that took place between 2003 and 2013 were due to the energy transition and climate policy, while 46 percent were caused by rising fuel prices and exemptions for industry.

The issues of supply security and competitiveness on the energy supply market were the focus of a further Oeko-Institut project. Together with the consultancy company LBD and the law firm Raue LLP, our scientists were commissioned by WWF Germany to develop a model for a new market mechanism capable of providing effective support for the ongoing expansion of renewable energy sources. The “focused capacity market” provides for ways of remunerating the provision of energy supply capacity in the “existing power plants” and “new power plants” market segments so that supply is guaranteed if shortages occur in the renewables sector. Capacity payments could be disbursed via auctions for one or four years or over 15 years. This gives investors and operators greater margins of certainty when planning ahead – and supports the further reconfiguration of our energy system.

*Hauke Hermann is an expert in sustainable energy supply systems. His work is focused on developments in the electricity market and the assessment of climate change mitigation instruments. He also looks into the challenges posed by emissions trading systems. He has been working in the Oeko-Institut's Energy & Climate Division since 2009.*

### Project profile

**Project title:** Concise analysis of the rise in the EEG surcharge in 2013. Energy pricing trends caught between the energy transition, energy markets and industrial policy. The energy transition costs index (EKX); focused capacity markets. New market design for the transition to a new energy system

**Contact:**

Hauke Hermann, [h.hermann@oeko.de](mailto:h.hermann@oeko.de)  
 Charlotte Loreck, [c.loreck@oeko.de](mailto:c.loreck@oeko.de)

**Institute Division:** Energy & Climate (Berlin)

**Project partners:**

LBD Beratungsgesellschaft consultancy company  
 Raue LLP international law firm (focused capacity markets)

**Timescale:** Summer 2012

**Further information:** [www.energiewende.de](http://www.energiewende.de)

*“Our analyses enable politicians and the public to make key decisions in favour of a sustainable energy system. We are working on a vision for 2050 while also providing rapid input to current policy debates, for instance on the present increase in electricity prices and the EEG surcharge.”*



# Climate performance in transport

## Mitigation potential to 2030

**Some 20 percent of greenhouse gas emissions in Germany are caused by traffic and transport. This is a considerable climate challenge – not least against the backdrop of the predicted growth in both private transport and goods traffic. What are the measures that might nonetheless help to reduce emissions? Some answers to this question are provided by the project Renewbility II, a joint research project between the Oeko-Institut, the Institute of Transport Research of the German Aerospace Centre, and the Fraunhofer Institute for Systems and Innovation Research.**

In the research programme Renewbility II, supported by the German Federal Environment Agency and the Federal Environment Ministry, our scientists examined what contribution can be made by the transport sector towards climate change mitigation by 2030. To do so they made use of the model devised

in predecessor project Renewbility I and developed it further. Thus in Renewbility II, for example, the economic impacts of a sustainable mobility strategy were also studied. One essential component of the project was, again, the inclusion of key mobility stakeholders in the process of developing the model further and in designing an ambitious mitigation scenario.

By 2030 greenhouse gas emissions from traffic and transportation can be reduced by 37 percent (compared to 2005 levels) and thus by some 84 million metric tons of greenhouse gas equivalents, according to one of the key results produced by the research team. To achieve this, however, ambitious measures are needed such as much more efficient vehicles and optimised transportation chains. The analysis shows once again the differences between private and commercial transport: in private transport greenhouse gas emissions could be almost halved using the package of measures devised. In commercial transport, by contrast, a reduction of only about 17 percent is feasible, although a marked reduction of emissions per transported metric ton can be achieved. This is due above all to trends in overall transport volume. The research team predicts that by 2030 this will drop almost to 2005 levels in private transport, while in commercial transport a dramatic rise of 80 percent is predicted. However, by transferring goods transportation to the inland waterways or railways, for example, it is possible that this sector too can contribute towards reducing emissions.

*The focus of Dr. Wiebke Zimmer's work is sustainable mobility. With a degree in chemistry and a doctorate in physics, she has been working at the Oeko-Institut since 2005 on, among other things, developing strategies for reducing CO2 emissions in the transport sector and on assessing alternative forms of propulsion and fuels.*

*"The German government and the EU have clear objectives for more climate-sensitive transportation: by 2020 energy consumption in this sector in Germany should be reduced by ten percent compared to 2005 levels, while the EU Commission wants to lower transport-related greenhouse gas emissions in the EU by 20 percent compared to 2008 levels by 2020. We need concrete, ambitious measures such as those studied within the Renewbility II project to achieve these objectives."*

### Project profile

**Project title:** Renewbility II. Scenario for an ambitious contribution by the transport sector towards climate protection

**Contact:**

Dr. Wiebke Zimmer, [w.zimmer@oeko.de](mailto:w.zimmer@oeko.de)

Florian Hacker, [f.hacker@oeko.de](mailto:f.hacker@oeko.de)

**Institute Division:** Infrastructure & Enterprises

**Sponsor:** Federal Environment Agency and Federal Ministry for the Environment, Nature Conservation and Nuclear Safety

**Project partners:** Institute of Transport Research of the German Aerospace Centre (DLR-IVF), Fraunhofer Institute for Systems and Innovation Research (Fraunhofer-ISI)

**Timescale:** 09/2010 – 11/2012

**Further information:** [www.renewbility.de](http://www.renewbility.de)

# Better data – but not only

## Second step in the REACH Baseline Study

For many years there have been sizeable gaps in the data on chemicals throughout the world. This has made it difficult to assess them – and to deal with them safely: if it is not known whether, for example, a substance causes irritation in the bronchial tubes, no appropriate safety measures can be put in place. The European chemicals regulation REACH was intended to change this. It set deadlines for collecting data and for assessing the safety of substances and their uses. A large number of substances have been registered within a short space of time. But has the quality of the data actually been improved? Have the risks been reduced? These are the questions being examined by the Oeko-Institut in the REACH Baseline Study for the European Commission and Eurostat.

Together with three research partners, Oeko-Institut scientists have been studying more than 200 representative substances to see what changes REACH has made with regard to data quality and risks. The Oeko-Institut has developed indicators for this analysis which take account of various aspects of REACH, such as the registration of substances and the way particularly harmful substances are dealt with. Key to the analysis was the Risk & Quality Indicator System, for risk and quality are pivotal concepts when dealing with chemicals.

When REACH was introduced in 2007, for each of the representative substances the quality of the availab-

le data was determined and the risks of the substance and of its uses were estimated using a benchmark parameter. Five years on, in 2012, these factors were analysed again by the research partners. A special focus was on those representative substances that are manufactured and imported in large quantities: 1000 metric tons or more per year, per manufacturer or per importer. These "high volume" substances had to be registered under REACH by 1 December 2011.

The study shows that, for many substances, registration under REACH has improved the quality of the available data; the parameters indicate a reduced risk. Nonetheless, opportunities for improvement remain. For example, in the case of many substances there is less information available on environmental and consumer protection than on health and safety in the workplace. Further improvements in the registration of substances are possible and necessary, and the results of the REACH Baseline Study help to show what needs to be attended to in doing so.

*Sustainable chemistry – this is the focus of the projects run by Prof. Dirk Bunke. He heads up this area of research at the Oeko-Institut, where he has been working since 1992. His studies range from the assessment of individual substances through to advising companies on the selection of substances.*

### Project profile

**Project title:** The REACH Baseline Study – 5 years update

**Contact:**

Prof. Dirk Bunke, [d.bunke@oeko.de](mailto:d.bunke@oeko.de)

**Institute Division:** Sustainable Products & Material Flows

**Client:** European Commission / Eurostat

**Project partners:** FoBiG GmbH (Freiburg), DHI (Denmark), INERIS (France)

**Timescale:** 01/2011 – 03/2013

**Further information:** <http://bit.ly/XDc7yp>

*"If we want to ensure that chemicals are handled safely then we need to know what their properties are and how they are used. The aim of REACH is to make marked improvements in the data. But what happens to substances under REACH? How do the data change? And how do risks change? In the REACH Baseline Study the Oeko-Institut has chosen a quite specific approach. A fixed set of more than 200 substances determined "pre-REACH" is tested at regular intervals."*



# What's the state of resource conservation and accessibility?

## A sustainability matrix for Deutsche Telekom

Sustainability is a popular catchword. So many organisations want to achieve more sustainability – be they banks, car manufacturers, or energy suppliers. Often, though, it is hard to tell who is serious about sustainability and who isn't. By working on a method for assessing sustainability, Deutsche Telekom AG has demonstrated that it is taking the issue seriously. The Oeko-Institut has been commissioned by the company to create a comprehensive sustainability matrix that enables it to assess its products and services in terms of sustainability and to draw conclusions for their future development.

The PROSA method (Product Sustainability Assessment) was used to develop the sustainability matrix, with additional criteria being developed by drawing in part on the telecommunications sector report of the Global Reporting Initiative (GRI). Thus the comprehensive criteria for the sustainability matrix now

include product factors such as accessibility, life-cycle costs and climate-friendly design alongside company-specific criteria such as the vehicle fleet. Production and the supply chain were also included. Since the matrix deals with many different topics, including costs and toxicological issues, it was made subject to an internal evaluation as well as a stakeholder review. A customer survey was also carried out and an input and evaluation tool was developed. The latter is able to generate an individualised sustainability report for the product in question while also enabling an integrated assessment that results in a scoring.

These steps have created the foundations for subjecting the various products and services of Deutsche Telekom – including end user devices, services and tariffs – to a sustainability assessment and identifying further steps on this basis. The results can thus be fed into product development and into the improvement of products and services as well as into the elaboration of specifications for purchasing and procurement. The sustainability matrix serves additionally to ensure that customer communications are improved – it enables appropriate customer surveys to be conducted but can also serve as the starting point for sustainability labelling. Last but not least it makes it possible to integrate sustainability into company management procedures as a key performance indicator – a path which surely not every company that talks about more sustainability is prepared to go down.

*Siddharth Prakash looks at the many facets of sustainable consumption and sustainable products. He holds a Masters in Sustainable Forestry and Landscape Use and has done a postgraduate degree course focusing on international development cooperation. He has been working in the Oeko-Institut's Sustainable Products & Material Flows Division since 2008.*



*"How can we judge the sustainability of a company's entire range of products and activities – from the router through to the app, from production through to waste disposal? How can we draw up recommendations for the company itself and for its customers? The sustainability matrix for Deutsche Telekom is a grand design, one that has model character: it shows other companies an effective path towards greater sustainability along the entire value chain."*

science

### Project profile

**Project title:** Set of criteria for assessment of the products and services of Deutsche Telekom

**Contact:**

Siddharth Prakash, [s.prakash@oeko.de](mailto:s.prakash@oeko.de)

Prof. Rainer Griesshammer,  
[r.griesshammer@oeko.de](mailto:r.griesshammer@oeko.de)

**Institute Division:** Sustainable Products & Material Flows

**Client:** Deutsche Telekom AG

**Timescale:** 05/2011 – 12/2012

customers

NGOs

# Appraising underground structures

## Spatial planning beneath the surface

**There's a lot going on underground. This is where natural gas is stored and waste disposed of, drinking water tapped and coal mined. And a lot more will be going on in the future: the expansion of renewable energies needs the space below ground as does the planned carbon capture and storage. Given the growing and increasingly varied demands being made on the Earth's subterranean realm, conflicts over use are set to increase as well. A form of ecologically oriented underground spatial planning is therefore indispensable. Together with the Leibniz Institute of Ecological Urban and Regional Development (IÖR), the Oeko-Institut is studying whether the principles of above-ground spatial planning can be put to use here as well.**

When undertaking spatial planning beneath the Earth's surface, it is important to consider not only ecological functions but also economic and social expectations and needs – so these need to be analysed as well. At the same time it is necessary to develop criteria for dealing with conflicts over use. There is also the question of how the statutory framework and the existing instruments of spatial planning can be used and developed further for the subterranean realm. These legal and planning issues are at the centre of the work done by the Oeko-Institut and the IÖR for the Federal Environment Agency. In their second interim report of November 2012 they assess the German Spatial Planning Act and find that it does offer a suitable legal framework. It is not adequate,

however, for coordinating divergent land-use claims in underground spatial planning.

The planning instruments are broadly suitable, according to the experts, although here too there is a need for adjustments – for example, with regard to improved cooperation between overall spatial planning and specialist plans for, say, mining or water-resource uses. This is important for preventing poor planning and adverse impacts on protected resources. In addition, the composition of the soil and rock below ground has a decisive influence on the way planning is approached. One particular aspect, for example, is its potential for three-dimensional usage – unlike space above-ground, plans for underground use can be geared towards the individual rock layers. Thus geological conditions also play an important role in underground spatial planning. This is a further reason why a prudent approach that includes planning, geological and legal considerations is indispensable for the future use of the subterranean realm.

*Legal expert Regine Barth began working for the Oeko-Institut in 2000. In 2001 she became the head of the Oeko-Institut's Environmental Law & Governance Division. Her expertise is especially brought to bear in the priority research area of environmental law as well as in the analysis and design of policy instruments.*

### Project profile

**Project title:** Underground spatial planning – Environmental protection proposals aimed at improving the information base regarding above-ground and underground activities for designing a set of planning instruments and for finding sustainable solutions to conflicts over use

**Contact:** Falk Schulze, [f.schulze@oeko.de](mailto:f.schulze@oeko.de)  
Regine Barth, [r.barth@oeko.de](mailto:r.barth@oeko.de)

**Institute Division:** Environmental Law & Governance

**Client:** Federal Environment Agency

**Project partner:** Leibniz Institute for Ecological Spatial Development (IÖR)

**Timescale:** 11/2011 – 07/2013

*"We need to understand more about what goes on in the subsoil. Although we have been using it for a long time now, we are not sufficiently familiar with it. The legal framework conditions as well as planning procedures need to be developed further as well. The space below ground will acquire increasing importance in the future. That is why we need new methods such as those for three-dimensional planning. Digital technology with its ability to visualise 3D models offers a valuable basis for this."*



# More nano in REACH!

## Improving nanomaterial disclosure

**The use of nanomaterials in everyday consumer products has become commonplace and is likely to increase. As yet, no sufficient information is gathered about the potential impacts of such materials. The Oeko-Institut's scientists recommend adjusting the European Union's chemicals regulations – REACH and CLP – to do justice to the special characteristics of nanomaterials. In a study commissioned by the German Federal Environment Agency, they have elaborated recommendations for a revision of the instruments in REACH and CLP.**

At present, under REACH the manufacturers and importers of a substance are only obliged to identify its health and environmental risks if they place more than ten tonnes of the substance on the market per year. Many of the nanomaterials presently in circulation do not reach that tonnage threshold. A

particular challenge is presented by the question of whether nanomaterials should be treated as discrete substances to which specific provisions apply (such as lower tonnage thresholds) or merely as a form of the analogous macroscale substance (the bulk material), in which case they would be subject to the same provisions.

The Oeko-Institut study recommends that nanomaterials be treated as discrete substances under law for the purposes of certain requirements under REACH, and that the tonnage threshold for them be reduced to one tonne per year. This is necessary because the nano scale of the materials means that their properties can differ fundamentally from those of the analogous bulk material even though the chemical composition is the same. The experts also urge that a definition of "nanomaterial" be taken up in REACH, and that the criteria by which nanomaterials are distinguished – both among themselves and from the analogous bulk material – be refined.

Such a distinction changes the requirements upon the manufacturers and importers of chemical substances, who, in the Oeko-Institut's opinion, should inform their downstream users about the risks in separate safety data sheets for nanomaterials and bulk materials in future. The sheets should provide further types of information about the nanomaterial, such as any surface modification.



*"The ultimate objective of REACH is to protect human health and the environment. If that goal is to be achieved with regard to nanomaterials, it will be essential to amend the registration and testing requirements under REACH and CLP. In our report we recommend a separate treatment of nanoscale substances, and stricter requirements upon manufacturers and importers."*

*Andreas Hermann contributes his legal expertise to the Oeko-Institut with a special focus on technical environmental law. A staff researcher with the institute's Environmental Law & Governance Division since 2001, one of his special interests is how to apply governance instruments to improve the environmental performance of new technologies.*

### Project profile

**Project title:** Legal questions regarding the application of the substance definition to nanomaterials within the framework of the REACH Regulation

**Contact:**

Andreas Hermann, [a.hermann@oeko.de](mailto:a.hermann@oeko.de)

**Institute Division:** Environmental Law & Governance

**Client:** German Federal Environment Agency

**Timescale:** 04/2011 – 12/2012

**Further information:** <http://bit.ly/137RZaV>

# Round table talks

## Providing expertise for reconciliation

The groundwater in the Hessian region of Ried has long been at the centre of intense conflict. It is used as a drinking water supply for the Rhine-Main conurbation and the groundwater table therefore already gone down dramatically, so that trees whose roots no longer reach down far enough suffer as a result. At the same time, high groundwater levels have often led to agricultural land and homes becoming waterlogged. So should the water table be raised or a low level accepted? Proponents of both options have powerful arguments in favour of each. In 2012 the state of Hessen convened a Round Table in order to mediate in this difficult situation, with support provided by Oeko-Institut experts.

Groundwater use in the Hessian Ried impacts on a variety of interests: local residents and farmers have just as valid concerns as water supply companies, foresters and nature conservationists. Currently, discussions are focused on woodland preservation because the woodlands and their multifarious functions are, without doubt, particularly worthy of protection.

The Round Table is an attempt to take due account of the contrasting interests involved and to mediate between them. Regular gatherings have been organised to this end. The idea is that the participants come up with recommendations for improving the groundwater situation in the region to benefit the woodlands – without damaging agricultural land or nearby housing. The involvement of the Oeko-Institut has enabled all the participants to gain access

to independent scientific advice in a wide variety of realms, including environmental law and life-cycle assessments. In a process coordinated by the Nuclear Engineering & Facility Safety Division, questions are passed on to the relevant experts and the responses made available to all the Round Table participants. At the same time the Oeko-Institut has been tasked with providing back-up for and ensuring the quality of external expert reports produced during the process.

The tasks entrusted to the Round Table are varied – pondering the problems, generating trust, ensuring that disparate interests are reconciled. To tackle these tasks effectively, all the participants must be prepared to make compromises. Reaching agreement in this conflict will not be easy. But the expertise provided by the Oeko-Institut may provide part of the solution.

*Stefan Alt is a geoscientist who worked for more than ten years as an independent consultant before taking up employment at the Oeko-Institut in 2007. He is based in the Nuclear Engineering & Facility Safety Division, working on projects to do with soil and groundwater conservation, the disposal of hazardous waste as well as the interim storage and deep geological disposal of radioactive waste.*

### Project profile

**Project title:** Scientific support for the Round Table on "Improving the groundwater situation in the Hessian Ried"

**Contact:**

Stefan Alt, [s.alt@oeko.de](mailto:s.alt@oeko.de)

Angelika Spieth-Achtnich,  
[a.spieth-achtnich@oeko.de](mailto:a.spieth-achtnich@oeko.de)

**Institute Division:** Nuclear Engineering & Facility Safety

**Client:** Hessian Ministry of Environment, Energy, Agriculture and Consumer Protection

**Timescale:** from August 2012

**Further information:**

[www.rundertisch-hessischesried.de](http://www.rundertisch-hessischesried.de)

*"The Round Table for the Hessian Ried poses a special challenge for the Oeko-Institut. The expertise of many different scientists from several of our divisions is called for in this process. We answer questions about groundwater, nature conservation and woodland management but also provide information on the statutory framework and life-cycle assessments."*

water supply

Farmers

municipalities

# Cooperation and coordination

## Implementing the EU renewables directive

**By 2020 renewable energy should account for 20 percent of gross final energy consumption in Europe – this is the stated aim of the EU directive on the promotion of the use of energy from renewable sources. In order to achieve this goal, different percentage shares were set out for the different member states: Germany, for example, should cover 18 percent of its gross final energy consumption from solar, wind and other sources by that date. The member states have their own national action plans in which they determine which instruments they wish to use to achieve their renewable energy targets. At the same time they receive support for implementation from the European Commission in the form of specific research projects and the development of best practice guidelines. The Oeko-Institut has been involved in both.**

To achieve the 20 percent target the European Commission is pursuing two key strategies: one is cooperation between the different countries and the other

is European-level coordination of the funding instruments. Research on the issue of cooperation between Member States has been carried out in the RES4LESS project. Its aim is to support those countries unable to achieve their stated targets without cooperative mechanisms – be it because the natural conditions for generating energy from renewable sources is insufficient or the costs of implementation are too high. One way in which such countries could achieve their targets is via a statistical transfer – that is, the subsequent purchase of renewably generated energy from another country – or by participating in a project in another country (a “joint project”). In this context the Oeko-Institut set out to analyse the obstacles posed to such forms of cooperation by the grid system. According to the researchers’ results, these are above all the costs of connecting renewable energy facilities to the grid, the management of feed-in capacity and grid capacity differences between Member States.

In the RES LEGAL project the Oeko-Institut also provided advice to the Commission on how instruments aimed at supporting renewable energies can be better coordinated. Up to now, for example, rates of support have been calculated differently in the different member states – leading to differences in the costs of expansion. Given this situation the Oeko-Institut analysed different systems for providing support for renewable energies and has been supporting the Commission in producing guidelines for the Member States.



*Christoph Heinemann studied geography, economic policy and business administration. He has been working in the Energy & Climate Division of the Oeko-Institut (Freiburg) since 2011, devoting his time to, among other things, regulatory issues affecting the integration of renewable energies as well as energy system modelling.*

*“How can the EU targets for expanding renewables be achieved? Various research projects for the European Commission are attempting to find an answer to this question. One thing is for sure, though: the key to achieving targets lies in cooperation and a strategically coordinated procedure. In this way, energy-generating potential can be increased where it is most cost-effective, and we can learn from successful examples of promoting renewable energies.”*

### Project profile

**Project title:** RES4LESS – Cost-efficient and sustainable deployment of renewable energy sources towards the EU 20% target by 2020, and beyond; RES LEGAL – Legal Sources on renewable energy

**Contact:**

Dr. Dierk Bauknecht, [d.bauknecht@oeko.de](mailto:d.bauknecht@oeko.de)

Christoph Heinemann, [c.heinemann@oeko.de](mailto:c.heinemann@oeko.de)

**Institute Division:** Energy & Climate  
(Freiburg/Darmstadt)

**Client:** European Commission

**Project partner:** ECN (Energy Research Centre of the Netherlands, Amsterdam), Eclareon (Berlin) and others

**Timescale:** 01/2011 – 12/2012

**Further information:** [www.res4less.eu](http://www.res4less.eu)  
[www.res-legal.eu](http://www.res-legal.eu)



electricity suppliers

EU Commission

Finance Ministry

# Safety status: poor

## Fessenheim and Beznau reactors under scrutiny

**Earthquakes, flooding and power failures – a nuclear power plant needs to remain secure and maintain safety despite any number of potential incidents. To this end German nuclear facilities have safety systems which, additionally, must be specially protected, have multiple safety components (redundancy) and must operate largely independently of one another. The nuclear power plants at Fessenheim (in France) and Beznau (in Switzerland) show signs of lower safety levels compared to German facilities. The Oeko-Institut along with the Bremen Physics Bureau analysed their safety standards with regard to earthquakes and flooding as well as the impacts of a power and coolant failure on the reactor itself and on the fuel rod storage pool.**

The experts were commissioned by Baden-Wuerttemberg's environment ministry to compare the safety status of the two power plants with that of German facilities. They did so using the assessment standards developed in 2011 by the German Reactor Safety Commission (Reaktorsicherheitskommission, RSK). The analysis drew on documents produced in the course of the EU stress tests as well as other published information materials such as the results of periodic safety reviews. One outcome was that the level of redundancy in Fessenheim and Beznau is lower than in Germany. In all the facilities examined, a single failure in one safety system can generally be dealt with. In the Beznau and Fessenheim plants, though – unlike in the German ones – no other failure (due to repairs, say) must be allowed to occur at this point in time.

In addition to the lower level of redundancy the analysis identified weaknesses in the independence of the redundancies – such as in the coolant feed-in systems, which are absolutely crucial over the long term for drawing heat out of the reactor. In the Beznau and Fessenheim plants these draw on a single container: serious problems are guaranteed if this fails. Fessenheim and Beznau also fail to match the standards of German pressurised water reactors when it comes to the safety of the fuel rods in the storage pool.

The Oeko-Institut also confirmed that questions remained unresolved with regard to other European nuclear power plants, as many safety-related events such as coolant loss and exceptional situations such as plane crashes have not yet been looked at in the EU stress tests. This means that it is imperative to undertake additional more detailed safety analyses.

*Mechanical engineer Stephan Kurth has been working at the Oeko-Institut since 1995 and currently heads up the Facility Safety team. He is also a member of the RSK committee on reactor operations as well as the Commission for Facility Safety.*

### Project profile

**Project title:** Analysis of results of the EU stress tests on the Fessenheim and Beznau nuclear power plants

**Contact:**

Dr. Christoph Pistner, [c.pistner@oeko.de](mailto:c.pistner@oeko.de)  
Stephan Kurth, [s.kurth@oeko.de](mailto:s.kurth@oeko.de)

**Institute Division:** Nuclear Engineering & Facility Safety

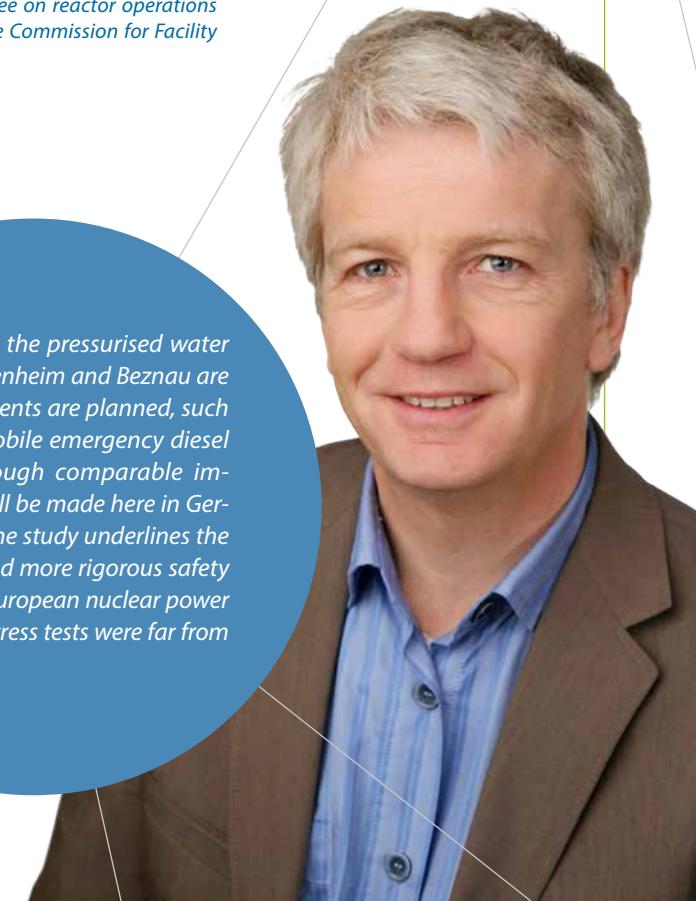
**Client:** Baden-Wuerttemberg Ministry of the Environment, Climate Protection and the Energy Sector

**Project partner:** Physics Bureau Bremen

**Timescale:** 03 – 08/2012

**Further information:** <http://bit.ly/XTpvy1>

*"Safety levels in the pressurised water reactors at Fessenheim and Beznau are poor. Improvements are planned, such as acquiring mobile emergency diesel generators, though comparable improvements shall be made here in Germany as well. The study underlines the fact that we need more rigorous safety analyses of all European nuclear power plants. The EU stress tests were far from sufficient."*



# When is recovery worthwhile?

## Life-cycle assessments of lithium-ion battery recycling

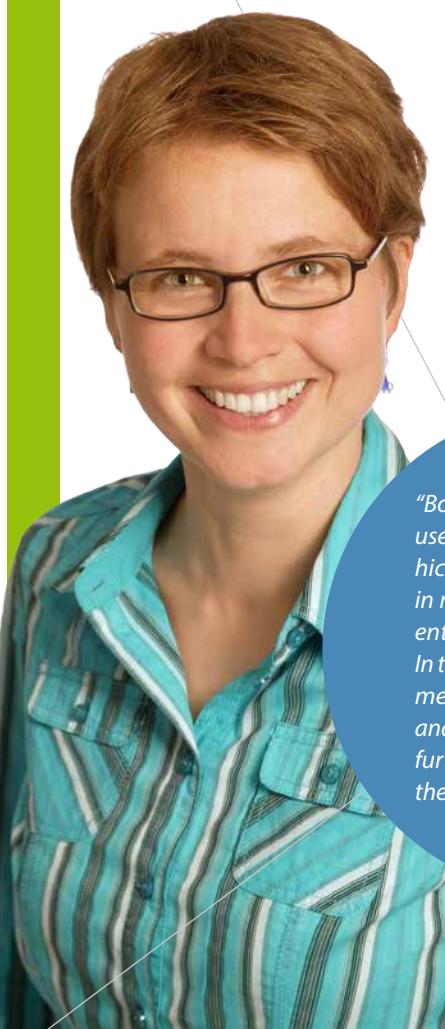
The batteries used to power electric cars contain important materials – base metals such as aluminium, copper and nickel along with technology metals such as cobalt and lithium. If electromobility increases in the future, so too, eventually, will the arisings of discarded batteries. This is why recycling procedures are already being developed now for lithium-ion batteries, as the recovery of materials is important in terms of ecology, resource policy and economics. Two life-cycle assessments conducted by the Oeko-Institut show where the ecological benefits lie and where there is room for improvement.

What ecological utility does the recycling of raw materials from batteries have in comparison to primary production? To answer this question in relation to lithium-ion batteries in the automotive sector, the Oeko-Institut conducted life-cycle assessments for the LithoRec and LiBRi procedures. Both procedures

have been promoted by the German environment ministry (BMU) and are at the developmental stage.

The life-cycle assessments confirm that recovering metals from lithium-ion batteries brings marked ecological benefits compared with primary production. This applies initially to the metals used in the battery casing, such as stainless steel, aluminium and copper: the fact that they are readily accessible and that there is an existing infrastructure for these metals is advantageous here. But it also goes for the recycling of the metals contained in the cathodes – nickel and cobalt – as well as the copper in the anode collector, which in most respects involves less harm to the environment than primary production. In the latter cases, however, recycling is much more complicated due to the small amounts and more dispersed presence of materials. Some of the recycling stages still require large amounts of energy or auxiliary inputs: in these cases, procedures need to be further improved. In addition, the assessment varies depending on the data for primary production used in the comparison, which are currently far from robust.

The Oeko-Institut will continue in the future to address recycling procedures for lithium-ion batteries and provide support for the BMU-supported LithoRec II and EcoBatRec projects. As well as producing life-cycle assessments, this will also involve looking closely at the ecological impacts of primary production of cobalt and nickel.



*The main part of Cornelia Merz's research involves producing life-cycle assessments and material flows analyses. She is a qualified engineer for energy and process technologies, and has been contributing her expertise to the Infrastructure & Enterprises Division of the Oeko-Institut since 2010.*

*"Both procedures for recycling used batteries from electric vehicles have ecological benefits in many respects. But they also entail environmental impacts. In the course of further development work the use of energy and auxiliary inputs ought to be further reduced in some steps of the procedures."*

### Project profile

**Project title:** Life-cycle assessments on LithoRec – Recycling of lithium-ion batteries as well as LiBRi – Development of a workable recycling strategy for high-performance batteries in future electric vehicles

**Contact:**

Cornelia Merz, [c.merz@oeko.de](mailto:c.merz@oeko.de)

Matthias Buchert, [m.buchert@oeko.de](mailto:m.buchert@oeko.de)

**Institute Division:** Infrastructure & Enterprises

**Sponsor:** German Federal Ministry for the Environment, Nature Conservation and Nuclear Safety

**Project coordination:** LithoRec: Technische Universität Braunschweig, LiBRi: Umicore AG & Co.KG

**Timescale:** 09/2009 – 09/2011

**Follow-up projects:** 2012 – 2015

**Further information:** <http://bit.ly/WRaD7g>

# Alliances for sustainability

## The Oeko-Institut's clients

Financial resources come mainly from third-party, project-based commissions as well as from member subscriptions and donations. The following list sets out a cross-section of the policy-making bodies, companies and civil society organisations we collaborated with during 2012:

### Policy-making and executive bodies

- Baden-Württemberg Ministry of Environment, Climate and Energy
- European Commission: Directorates-General for Energy, Research, Environment, Climate; EEA, Eurostat, Eaci, European Atomic Energy, Joint Research Centre
- European Environment Agency
- Federal Agency for Nature Conservation
- Federal Environment Agency
- Federal Ministry for the Environment, Nature Conservation and Nuclear Safety
- Federal Ministry of Economics and Technology
- Federal Ministry of Education and Research
- Food and Agriculture Organization of the United Nations
- Forschungszentrum Jülich
- Freiburg city environment department
- German Federal Environmental Foundation (DBU)
- German Parliament (Bundestag)
- Government of the Province of Lower Austria, Buildings Directorate, Environmental Engineering Division
- Hamburg Department of Urban Development and Environment
- KfW Bank Group
- Landschaftsverband Rheinland local authority services
- Lower Saxony Ministry of the Environment, Energy and Climate
- North Rhine-Westphalian Ministry of Economics, Energy, Building, Housing and Transport
- OECD
- Schleswig-Holstein Ministry of Agriculture, Environment and Rural Affairs
- Swiss Centre for Technology Assessment TA-SWISS
- UNEP
- United Nations University

### Industry

- Audi AG
- Beteiligungs- und Kunststoffverwertungsgesellschaft mbh
- Bosch Siemens Hausgeräte GmbH

- BP Europe SE
- Deutsche Telekom AG
- ENTEGA Vertriebs GmbH & Co. KG
- Eurima
- Fraport AG
- Globetrotter Ausrüstung Denart & Lechhardt GmbH
- Gore Associates GmbH
- Henkel AG &Co. KGaA
- HIPP OHG
- Krombacher Brauerei
- Lufthansa Cargo AG
- MTD - Products AG
- Neff GmbH
- Nordmann, Rassmann GmbH
- Rapunzel Naturkost
- REWE Group und REWE Zentralfinanz eG
- Stadtwerke Ulm GmbH
- StorimpeX ASphalTec GmbH
- Südsalz GmbH
- Tchibo GmbH
- Volkswagen AG

### Civil society

- Ärztinnen und Ärzte für den Umweltschutz (AefU; Physicians for the Environment, Switzerland)
- BEUC (The European Consumers' Organisation)
- BIO Intelligence Service
- Deutsches Tiefkühlinstitut e.V. (German Deep-Freezing Institute)
- Energie Vision e.V.
- Federation of German Industries (BDI)
- Gemeinnützige Umwelthaus GmbH Environment & Community Center
- German Caravaning Industry Association (CIVD)
- Greenpeace
- Haus der Kulturen der Welt Berlin
- Legacy for the Future Foundation
- Mercator Foundation
- RAL Quality Assurance Association for the Manufacture of Refrigeration Equipment
- RECS (Renewable Energy Certificate System) Germany
- Smart Energy for Europe Platform
- Utopia AG
- World Resource Institute
- WWF Germany

A full list of references is available (in German) at:  
[www.oeko.de/referenzen2012](http://www.oeko.de/referenzen2012)

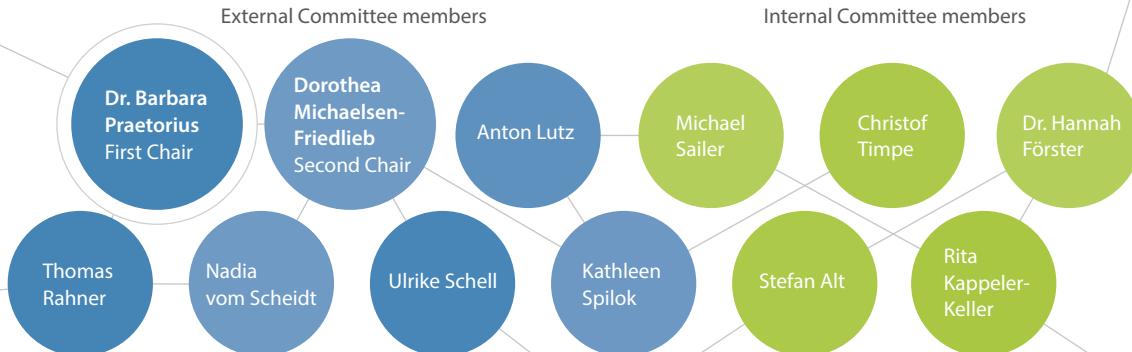
# Fresh thought, meshed work

## The Oeko-Institut's internal constitution

The Oeko-Institut is constituted as a non-profit association (Öko-Institut e.V.) with currently more than 2500 members, including over 25 local authorities. The 246 active members elect a Committee that runs the as-

sociation. The Committee transfers responsibility for day-to-day operations to the Executive Board. The Executive Board performs its tasks in cooperation with the institute's scientific divisions and central services.

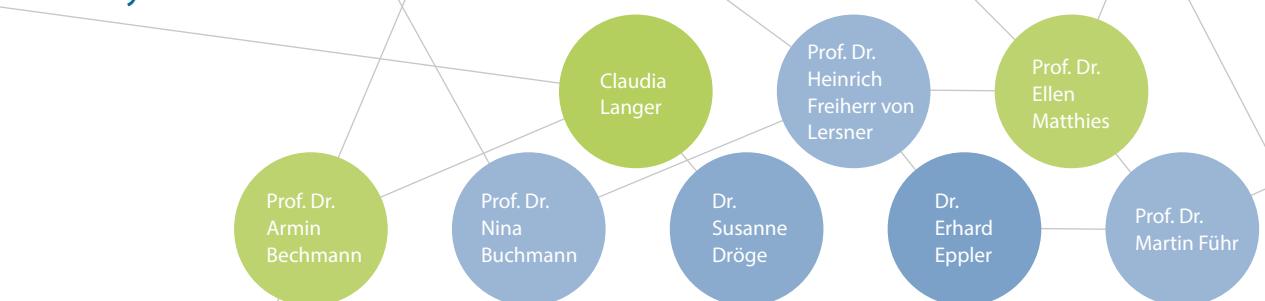
### Committee



### Executive Board



### Advisory Board



## Organisational units at the institute



**Christof Timpe**  
Head of Energy & Climate Division (FR/DA)  
[c.timpe@oeko.de](mailto:c.timpe@oeko.de)



**Dr. Martin Cames**  
Head of Energy & Climate Division (B)  
[m.cames@oeko.de](mailto:m.cames@oeko.de)



**Beate Kallenbach-Herbert**  
Head of Nuclear Engineering & Facility Safety Division  
[b.kallenbach@oeko.de](mailto:b.kallenbach@oeko.de)



**Dr. Matthias Buchert**  
Head of Infrastructure & Enterprises Division  
[m.buchert@oeko.de](mailto:m.buchert@oeko.de)



**Carl-Otto Gensch**  
Head of Sustainable Products & Material Flows Division  
[c.gensch@oeko.de](mailto:c.gensch@oeko.de)



**Regine Barth**  
Head of Environmental Law & Governance Division  
[r.barth@oeko.de](mailto:r.barth@oeko.de)



**Boris Hüttmann**  
Head of IT  
[b.huettmann@oeko.de](mailto:b.huettmann@oeko.de)



**Thomas Manz**  
Head of Finance  
[t.manz@oeko.de](mailto:t.manz@oeko.de)



**Mandy Schößig**  
Head of Public Relations & Communications  
[m.schossig@oeko.de](mailto:m.schossig@oeko.de)



# Communicating science

It would be hard not to have noticed the issue of the Energiewende, the transition to sustainable energy systems, in 2012. The shift towards an electricity supply based mainly on renewable energies entails more than merely technical challenges: one of the key tasks is to reassure the public in the face of their uncertainties and reservations.

The information communicated by the Oeko-Institut helps foster understanding, acceptance and support among the public when it comes to the changes needed to create a sustainable future – not only regarding energy but also around issues to do with transport, resources, waste management, sustainable shopping choices etc. Both on our website

and in the Oeko-Institut magazine we highlight our key research results in a precise, easy-to-understand way, while simultaneously seeking to do justice to their complexity. We increasingly insert explanatory graphics whenever words are not enough.

Participating in the social media – Twitter, Youtube, Flickr and Slideshare – enables us to help make Oeko-Institut topics accessible to a broader public. After all, alongside the decision-makers in politics, business and science, it is also ordinary citizens whom we want to encourage to act sustainably and whose acceptance we seek to gain for the political decisions that need to be made.

## The Oeko-Institut's classic information channels:

### **eco@work**

Energy transition, urban mining, electromobility and Fukushima were the key themes in the institute's 2012 magazine. Alongside these issues, eco@work reports on both new and already completed Oeko-Institut projects as well as presenting a sustainable project from outside the institute.

[www.oeko.de/epaper](http://www.oeko.de/epaper)

### **Website [www.oeko.de](http://www.oeko.de)**

Current research results can be found on our website along with a host of easy-to-read background information, studies and graphics, all available for free download, as well as further information from the Oeko-Institut.

### **Conferences and events**

The 2012 annual conference of the Oeko-Institut furthered scientific and political debate around the issue of transitioning to new energy systems. Other events such as workshops and talks help to transmit the outcomes of our research to a wider audience.

### **Interviews with the press**

The Oeko-Institut arranges press interviews on specific occasions, giving journalists an opportunity to meet institute staff in person and get answers to complex questions.

## Oeko-Institut in the social media:

### **Twitter**

We regularly send short news items from the Oeko-Institut on Twitter to (currently) more than 2000 followers. We provide information about current news from the institute, discuss and respond as quickly as possible to any questions.

[www.twitter.com/oekoinstitut](http://www.twitter.com/oekoinstitut)

### **Slideshare**

Presentations by our scientific staff can be read on Slideshare. Here you will also find other Oeko-Institut publications on various issues.

[www.slideshare.net/oeko-institut](http://www.slideshare.net/oeko-institut)

### **Flickr**

On this image hosting platform we publish both photographs and information graphics that give a visual explanation of key research results. If you wish to use specific images (for non-commercial purposes), feel free to contact us.

[www.flickr.com/oekoinstitut](http://www.flickr.com/oekoinstitut)

### **Youtube**

Clips from talks and events as well as media interviews and presentations by our research staff are available on Youtube.

[www.youtube.com/oekoinstitut](http://www.youtube.com/oekoinstitut)



# Networks in society

## Members of the Oeko-Institut

2.500 members make up the Oeko-Institut's firm support base in society. Their contributions and donations, alongside project funding from public and private sector clients, give us a solid foundation on which to conduct our independent research. Just how important the Oeko-Institut's independent position is becomes apparent time and again when it comes to taking a stance, conducting our own projects, being listened to as a neutral voice – particularly in the case of issues that are hotly contested in society. Membership fees and donations enable us to occupy this special position within the wider German research community.

## Does good food have to be expensive? The 2013 donation project

At the end of 2012 we asked our members to support the current Oeko-Institut donation project entitled "Does good food have to be expensive?"  
Thanks to the numerous generous donations

that poured in by the end of January 2013 we are now able to get this project off the ground. One thing we want to show is what a high-quality, environmentally sound and healthy diet might look like in comparison to an average diet. Another aim is to highlight the differences in types of diet with regard to the impacts they have on the environment and health as well as their costs to the consumer and their externalised costs. Interestingly no real cost comparisons exist to date.

## Lifetime members: a crucial mainstay

The Oeko-Institut's 350-odd lifetime members are hugely important to its work. The idea of a lifetime membership came into being ten years ago and more and more people are choosing this form of support. The benefits? Lifetime membership entails less effort and brings long-term savings, while the Oeko-Institut can lower its administration costs. In addition, though, we are linked to our lifetime members in a special way over the period of their support.

**In order to be able to continue working on strategic, socially important issues in addition to our funded projects, we need donations and membership contributions. Please support us by becoming a member.**

**Further information:**  
<http://mitglieder.oeko.de/>

**Account details for donations:**  
 GLS Bank  
**Bank code:** 43060967  
**Account number:**  
 792 200 9900  
**IBAN:** DE50 4306 0967 7922 0099 00  
**BIC:** GENODEM1GLS

**Contact for members:**  
 Andrea Droste  
 Tel.: +49 761 45295-249  
 E-mail: [a.droste@oeko.de](mailto:a.droste@oeko.de)

**Freiburg office**

Postcode 1771  
D-79017 Freiburg  
Merzhauser Strasse 173  
D-79100 Freiburg  
Phone: +49 761 45295-0  
Fax: +49 761 45295-288

**Darmstadt office**

Rheinstrasse 95  
D-64295 Darmstadt  
Phone: +49 6151 8191-0  
Fax: +49 6151 8191-133

**Berlin office**

Schicklerstrasse 5-7  
D-10179 Berlin  
Phone: +49 30 405085-0  
Fax: +49 30 405085-388

[info@oeko.de](mailto:info@oeko.de)  
[www.oeko.de](http://www.oeko.de)