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and Research

Research for Sustainability – One Step Further

Results of the 6th BMBF Forum for Sustainability
9 – 10 September 2009, Hamburg



RESEARCH

Igniting ideas!

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Conference Background

6th BMBF Forum for Sustainability

Research for Sustainability – One Step Further

9 - 10 September 2009, Prototyp Lofts, Hamburg

The 6th BMBF Forum for Sustainability marked the start of the new BMBF framework programme for Research for Sustainability: After five years of successful FONA research, the programme provides new thematic priorities, strengthens international collaboration and calls for an even closer interlinking of fundamental and applied research. Prof. Dr. Frieder Meyer-Krahmer, State Secretary at the Federal Ministry of Education and Research, inaugurated the conference. Then Prof. Dr. Karin Lochte, Director of the Alfred Wegener Institute for Polar and Marine Research, shed light on the impact of fundamental research on sustainability.

The sessions on global responsibility in sustainability research and on innovations for climate and resources were complemented by the open final conference of the BMBF national research programme “Sustainable Forestry”. “Green Talents” presented young scientists from all over the world who have developed creative and innovative solutions in the field of sustainability.

The 6th BMBF Forum for Sustainability featured discussions on the state of the art in research as well as on future research priorities and projects. In parallel sessions around 300 participants discussed projects, ideas and approaches and their contribution to sustainable development. The conference attracted experts from politics, science and industry. The conference presented bestpractice examples, explored new solutions, initiated joint projects and fostered the network of the researcher community.

The two-day scientific programme covered the following topics:

- **A** Global Responsibility
- **B** Innovation for Climate and Resources
- **C** Sustainable Forestry

In addition, the social programme with conference dinner, sight-seeing programme and the so called “Locations of Organised Coincidence” offered manifold possibilities for making new contacts and initiating projects.

Welcoming Address

Prof. Dr. Frieder Meyer-Krahmer

State Secretary at the Federal Ministry of Education and Research, Germany



Ladies and gentlemen,

I am very pleased to welcome you today – also on behalf of my Minister, Professor Annette Schavan – to the 6th BMBF Forum for Sustainability in Hamburg.

That right here we have safe, solid ground under our feet is nothing short of a miracle: to erect solid structures and warehouses right at the river's edge in the port of Hamburg, the workers who built the warehouse district first had to drive 3.5 million oak pilings about 12 metres deep into the earth. This wooden foundation has borne the weight of houses up to seven stories high for over 100 years now – and as you can see by our conference centre, which was completely renovated in 2008, this foundation will obviously continue to serve as a reliable platform for investment in the future.

The centrepiece of the building is an absolutely outstanding collection of historic racing cars and

prototypes designed for one purpose only: to be faster than all previous models. And the best way to be even faster in those days was to reduce air resistance as much as possible by fine-tuning the design to the optimum streamlined shape. When you go through the collection, you see that the constructors of these vehicles applied boundless creativity and ingenuity to overcome the inexorable laws of physics – and they did so under extremely adverse conditions: because most of these historical sports cars and racing cars were developed during an era of chronic material shortages that necessitated extraordinary pioneering efforts and spawned ingenious technical ideas: the early post-war years.

Circumstances are completely different today and present new challenges for technicians, engineers and designers. With all of the uncertainty about the future, there is virtually no doubt about at least one condition: we live in a time of extremely rapid climate change, the causes of which are of human origin. The high concentration of CO₂ in the atmosphere has been identified as one of the root causes – levels that haven't been seen for thousands of years.

The German Advisory Council on Global Change (WBGU) recently published its findings on climate protection and delivered two important messages for policymakers. The first message is that we have to move even faster than the IPCC – the Intergovernmental Panel on Climate Change – told us two years ago. The council explains that if carbon dioxide emissions remain at today's level, we will have to execute a nosedive in CO₂ emissions already in 2020 – well, that gives us about ten years. For the moment, the level is still increasing. But the objective of limiting global warming to 2°C as agreed by the governments of the world's leading economic powers can only be achieved if we manage to begin reducing CO₂ emissions by no later than 2020.

The second message is that Germany actually has to be nearly CO₂-free in 2050. So we need a CO₂-neutral economy. How are we supposed to accomplish this? The political decisions so far are aimed at 2020 and saving 30 to 40 percent CO₂. But achieving CO₂-neutrality represents a tremendous challenge.

These messages make it clear once again that we have to make progress at the UN climate conference in December 2009 in Copenhagen, that we need a clear international framework, that we need a viable

worldwide emissions trading system and that we might even need a central climate bank. The way central banks used to protect their gold reserves, that's how we have to protect our CO₂ emission reserves and how we also have to distribute them equitably and fairly around the world. The WBGU made it clear that we need research and education for this, and it pointed out that along with a research strategy, there is also a particular need for an innovation strategy. Research and innovation are the keys to reaching the 2-degree target and aligning our economies, our life and our commerce to the objectives of sustainability.

This includes the development of efficient low-CO₂ and CO₂-free technologies and processes in the areas of industry and business and in the private sphere. Particular attention is currently focused on the area of mobility, where experts are considering questions such as: "How can we eliminate CO₂ emissions completely?" "How can we develop CO₂-free technologies?" "How can we sustainably satisfy the mobility needs of an internationally networked society?"

The vision of a CO₂-neutral economic system in which all human economic activity uses avoidance, CO₂ storage and the intelligent use of CO₂ to harmonise perfectly with natural terrestrial carbon cycles is obviously still a distant utopian future. But through research and innovation, we can approach that goal step by step. This is happening now in the area of mobility through the national electromobility development plan: Germany aims to become the leading market for electromobility! One key precondition for this is that powerful, safe and affordable batteries have to become available soon and they have to be produced in Germany. But this is not the only prerequisite – rather the overall system has to be addressed. This includes energy services relative to all aspects of electromobility, for example, and compliance with international standards.

In addition to CO₂ avoidance and storage, however, there is a third path that needs to be more thoroughly investigated – one that I believe is a very attractive alternative – and that is to take the CO₂ that is being stigmatised as a climate killer and to use it as a raw material: in other words, use it to achieve positive benefits. So far in this regard there are minor potential uses with algae formation for energy production, for chemical processes, but the whole idea is

still in its very early stages. But if we get to the point where we do not simply have to bury CO₂ but rather actually put it to some useful purpose, then that would be an incredibly attractive solution. Research policy is challenged here, particularly in the near term, to investigate and develop the opportunities of such intelligent use of CO₂.

Furthermore, we must also consider the specific question of how the economy and society can adjust to climate change and how to establish a framework for a secure future. Owing to the long-lasting impacts of its decisions, one sector that is under particularly intense pressure to adjust is forestry. Up until 20 or 30 years ago its primary and essentially unique purpose was to produce wood, but nowadays forestry has to fulfil several, sometimes mutually contradictory objectives simultaneously: It has to supply large quantities of wood, especially high-quality wood for construction and natural bio-energy. It has to maintain biodiversity and regulate the water balance. And it has to store carbon while serving man as a place for leisure and recreation.

These objectives sound wonderful, but in reality they pose difficult and complex problems for practitioners and decision-makers: for instance, today's forest conversion programmes call for planting more deciduous trees – but doesn't this production completely ignore a marketplace that continues to demand softwood? Do our efforts to achieve sustainability in Germany promote the illegal importation of tropical wood? Where will we get the wood to meet the growing demand for bio-energy? Is the competitive rivalry between material and energy usage inevitable? The interdisciplinary research associations of the National Research Programme "Sustainable Forestry" of the BMBF have been studying such issues, and here within the framework programme "research for sustainability" they will hold their final conference and present their results.

Which brings me to the future of research for sustainability at the BMBF: because the first BMBF framework programme in research for sustainability has already come to an end this year. Preparations for the follow-up programme are well underway, and without giving away too many details before the official announcement of the programme, here are some of the new elements will be emphasized: We will place greater emphasis on innovation than we did in the previous programme. Germany is a

world champion exporter of environmental technology and now we want to make more use of our strengths in climate research in order to become a technological pioneer also in climate protection and climate adaptation.

The BMBF is emphasizing new themes in research for sustainability – the scope is being expanded. Basic research into energy issues and earth system science, for example, constitute two new and important components in the new research approach. We want to stop drawing arbitrary boundaries between applied and basic research, and move toward an integrated research pipeline covering the full range from basic principles to applications. To put it somewhat simplistically: climate protection begins at the Neumayer Station in the Antarctic, spawns the development of new energy efficiency technologies, and ends up as user-friendly systems that optimise household energy consumption.

The new programme will maintain an interdisciplinary and transdisciplinary approach to research, the value of which has already been proven in the first BMBF “research for sustainability” framework programme: rigid boundaries between the disciplines have to be eliminated and networked thinking must become commonplace if research is to make a relevant contribution to the solution of sustainability problems. Researchers have to work together with companies and with the actors in society in order to understand previous motivations and open up new room for action.

Our research for sustainability will be more internationally oriented. That means greater cooperation at the European level, where Germany has long been a strong and active partner, and where it will further expand its activities. But this commitment will also extend beyond Europe. We are seeking closer contact and dialogue with developing and emerging countries whose dynamic economic growth will have far greater impact on the future of the planet than any impact that the already industrialised world will have: China, India, Russia, South Africa, Brazil – to name just a few of these key partners. We first have to understand the challenges and developments in these countries before we can develop joint concepts, solutions and technologies for the world of tomorrow.

And international cooperation is no different from cooperation here at home: it works best when smart people are involved. That’s why the BMBF sponsored a “Green Talents Competition” to recognise the research work of young international “green talent”. And I am honoured to present this year’s winners with their awards for exceptionally innovative research on sustainability.

The aforementioned elements are crucial for the sustainability research of the BMBF, the financial scope of which will be significantly expanded. We also believe here in the importance of confronting controversial subjects. Researchers must first be free to act, experiment and test hypotheses without the artificial constraint of preconceptions or taboos.

Ladies and gentlemen, it is clear that education, science and research will form a crucial foundation for growth, jobs and prosperity in the future leading to the creation of new products, processes and services. Efficiency improvements will produce the advantages that will safeguard jobs against increasing competition and falling profits. Promoting electromobility as I mentioned earlier is one such approach. Environmental technologies are emerging as the growth market of the future. There’s hardly any innovation today that doesn’t involve environmental technology.

But in order for these innovations to be able to have their effect, the appropriate conditions also have to be put in place. Indeed, research cannot create a breakthrough on its own.

Along with the ingenuity of scientists and engineers, Germany’s future role in the “green markets of the future” will primarily depend on the larger organisation of those basic conditions. The coordination and integration of environmental, research and innovation policies will become increasingly important. Good coordination between research sponsors and regulation is crucial to enable German entrepreneurs to position themselves stronger than ever at the forefront of the key environmental technology markets.

Government investments are concentrating on fields that will develop the markets of tomorrow. In our view, investing in research on environmental and sustainability technologies has the greatest potential to meet challenges like climate change while

generating long-term added value for the economy at the same time.

Ladies and gentlemen, in the tradition of past Fona forums and with a view toward the upcoming one, I hope this event brings you stimulating discussions, inspiring concepts and the opportunity to renew old contacts and forge new ones.

Thank you very much!

Key Note

Prof. Dr. Karin Lochte

Director of the Alfred Wegener Institute for Polar and Marine Research in the Helmholtz Association, Germany



Ladies and gentlemen,

I am very pleased to have the opportunity to say a few words to you about basic research and what it can contribute to sustainability. Preparing for the expected climate changes is one of the principle challenges that our society faces today, because it's a question of how our plans for the future will enable us to adapt to possible changes. To that end, we need to know more or less exactly where the trend is leading. I am going to share with you a few examples from climate research, and in so doing I'll naturally rely on the material with which I am most familiar.

That means I'll be looking at temperature increase, sea level and sea ice, and in each case I will tell you what we have seen so far and what the predictions about possible changes suggest. We all know that predictions can be wrong, but all of the

observations that we have at the moment point in one direction and I can only support what the German Advisory Council on Global Change (WBGU) has already emphasized, namely that we have no more time to lose.

Let's begin with a somewhat general introduction. There are different natural causes for climate change; not all change is caused by humans. We have external factors such as solar radiation – which is a factor that only changes over very long time scales, however. We have internal factors – tectonic aspects, for example, such as the opening up of seaways, but this too only occurs over very long time scales. We cannot change these, nor are they of any interest to us in connection with the discussion of sustainability. What we are interested in here are things that can change relatively quickly, such as interdependencies in the climate system. These are processes that can intensify on their own and can then lead to abrupt changes in the climate system. The anthropogenic causes, of course, are the ones that we are most likely to notice first – such as changes in the surface of the land due to farming or CO₂ emissions created by our energy production.

The climate system is an extremely complex system. Very many parts are interconnected and when you cause a change in one place then you have to check what else changes in the overall system. If we change atmospheric compounds, for example – I'll just mention aerosols here – then those aerosols in the atmosphere can inhibit the warming of the Earth's surface. If we now take measures to clean up the atmosphere, because it is reasonable for health reasons of course, then this can lead to further warming of the Earth's surface. So there are always very different aspects that must be taken into consideration.

The aspects that can be influenced by man include the change in the CO₂ content of the atmosphere and of other atmospheric gases and dust, and the change in the Earth's surface due to agriculture. Let's take a look at a few physical principles of temperature regulation: if the Earth had no atmosphere, then equilibrium radiation would generate a mean temperature of minus 18 degrees Celsius – and the Earth would be a block of ice. Well, biological processes in the past created a protective shield, an atmosphere, that holds a certain share of the radiant heat back on the Earth's surface, and has created a comfortable climate of plus 15 degrees on average. This process

occurred over the course of millions of years, and the protective atmospheric shield is a very fragile protective shield. Changes in the atmosphere affect many different processes on the Earth. That is exactly the point at which we want to begin – what have we done to the atmosphere, how have we disturbed the natural balance and what are the consequences?

In this connection, I would like to take a brief look at the change in the surface of the land. Most people are very familiar with the topic of CO₂ emissions, but changes in the surface of the land also have a strong effect on our climate. When a forest becomes farmland, for example, then this changes the reflection of the sunlight and the evaporation rate. I'm no agricultural expert, but I can certainly say that changes caused by agriculture have to be taken very seriously in terms of climate regulation. Overall it is fair to say that changes in land use account for about 22 percent of the increase in carbon dioxide and CO₂ emissions from the combustion of fossil fuels account for about 78 percent.

So that completes the introduction. Now I would like to report what we know about the temperature changes so far. Observations of temperature changes in the past 100 to 150 years show that we have seen an increase of about 0.7 degrees. So there has been a slight rise in the mean global temperature. But when we look at just the last 50 years, then we see that the rate of increase during this time period has doubled. So we have recorded an acceleration in the rate of temperature increase. And when we look closer still, then the warmest 14 years in the recent past have all occurred in since 1995. So we are moving in the direction of warming, there's no denying this.

The IPCC report gives various scenarios describing how climate warming will evolve. It is interesting to note that even if the CO₂ concentration in the atmosphere remains constant, there will be a warming of 0.5 degrees. Unfortunately in the temperature predictions for the different future scenarios, the uncertainties are greater on the high side than they are on the low side. That means we don't know whether further processes will accelerate the temperature evolution upward. As a scientist, of course, I regret that there are such large uncertainties. But we have to live with that and accept that we cannot say exactly how the curve will look over the next 100 years. But the general trend is clear.

Perhaps you recall the hot summer of 2003, which also caused many deaths. Most of the victims had already been suffering from health problems. Nonetheless, Europe was not prepared for such a hot summer. The temperature rise in Europe, modelled according to the business-as-usual scenario, suggests that such summer temperatures will be normal by around 2040 and that by around 2070 summers like the summer of 2003 will actually be considered unusually cool. How can we adapt to such a development in the event that we fail to achieve truly significant CO₂ reductions? That means we have to consider such developments in home construction, for example. Insulation materials are currently under development in order to reduce the consumption of energy for heating. But soon we will have to provide more energy-efficient cooling. Healthcare is also an important issue with regard to such a trend, of course. Moreover, these temperature increases will also have a very significant impact on agriculture and vegetation. Undoubtedly there will be many other effects in connection with this; the key is to identify where we have to convert our knowledge into practical applications.

The example of sea level enables us to observe the effect of climate change directly. The majority of glaciers are retreating as a result of warming; ninety percent of glaciers are apparently shrinking. There are also a few that are growing, but they are exceptions located in regions where precipitation has increased – places where more snow falls and more ice can form. Generally speaking, the glaciers are retreating and as they melt, they contribute to the flow of additional fresh water into the oceans causing the sea level to rise. The large ice sheets in Greenland and the Antarctic are especially significant. One example here is the break-up of the Larsen Ice Shelf. The break-up of Larsen A – that is the northern ice shelf on the Antarctic Peninsula – occurred in the 1990s, and then at the beginning of this century part of the Larsen B ice shelf broke off. A total of 16,000 km² have broken off, which corresponds to about eighteen times the area of Berlin. It only amounts to one percent of the Antarctic ice shelf.

Now the shelf ice that is floating in the ocean does not raise the sea level, but the loss of the adjacent shelf ice can cause the ice masses remaining on the land to move faster. We have some indications that the ice shelf dynamics are accelerating, that we are losing more ice from the ice sheets in West Antarcti-

ca and Greenland, and that this can raise the sea level faster than we have seen previously. We know from sediment analyses that the West Antarctic Ice Sheet is unstable. In the past, when temperatures were about three degrees higher than they are today, large portions apparently thawed, whereupon the sea level suddenly rose by about five metres. That means an increase in sea level isn't necessarily linear either, but can occur abruptly.

It has been estimated that taken all together the melting of the glaciers and the polar ice caps causes the sea level to rise by a little more than one millimetre per year. That might not seem like much, but it adds up over the years. On top of that, there is the thermal expansion of the ocean by 1.6 millimetres per year. Direct observation of sea level shows a rise of 3.1 mm per year. If it follows a linear course, that will amount to 31 cm in 100 years. New data on ice melting show that this trend has been accelerating too – actually, it has nearly doubled. Now we can assume about two additional millimetres per year as a result of the ice melting.

What does this mean for the predictions? The IPCC report states that we should expect about a half-metre rise in sea level through the end of this century. A model by Stefan Rahmstorf of the Potsdam Institute for Climate Impact Research, however, concludes that it will be more – one metre, perhaps even as much as one-and-a-half metres – and that's quite a significant difference. Because whether we have to expect a half-metre or one-and-a-half metres more by the end of this century is absolutely critical for dike builders. For certain regions, this has far-reaching consequences. There's a very interesting exhibition in Bremen on this subject entitled "Must Bremen Move?" It examines precisely this topic. And dike-building isn't the only thing affected by this; urban development must also adapt to such trends, right along with coastal agriculture. A higher sea level means not only rising water along the coasts, but also backwater in the rivers and in the groundwater that must be taken into consideration.

The last example I would like to use to illustrate aspects of climate change is that of sea ice. Sea ice is the ice that forms every winter in the polar oceans of the Antarctic and in the Arctic when the seawater freezes. Predictions show that the Arctic will warm up about twice as fast as the rest of the world. Depending on the scenario, temperatures there are expected

to increase by as much as nine degrees by the end of this century. In the northern hemisphere, some two to three percent of sea ice area is currently disappearing every decade. In the southern hemisphere, it is fluctuating back and forth, but we have yet to see a clear trend. Although the Antarctic Peninsula is already severely affected by temperature increase and ice loss, this has yet to have much impact on the Antarctic overall.

Observations in recent years suggest that the sea ice in the Arctic might be melting faster than we had previously predicted. Sea ice prognoses for the Arctic, in which different scenarios have been calculated, generally show that by the middle of this century there will probably be no more sea ice in the Arctic Ocean during the summer months. This is viewed as both an opportunity and a risk. A risk because that sea ice regulates the energy and water exchange between atmosphere and ocean.

Altered energy and water flows in the Arctic are having a strong impact on our climate. But this situation also carries with it an opportunity that many countries now recognise. First there are extensive oil and gas resources stored there that can be recovered, of course, once the ice retreats. That's why there is also strong interest already on the part of neighbouring states that want to stake claims there. And second it opens up the possibility of using the northern sea lanes. This would mean that the sea routes between Germany and Tokyo, for example, could be shortened by one third. Transport costs would then be lower. We know this is no utopian dream because our research ship, *Polarstern*, circumnavigated the North Pole in one season last year. No ship with a conventional drive has ever managed to do this before. Ten years ago it still would have been impossible. The exploration of raw materials in the Arctic Ocean is also worth mentioning, and the fishing industry will relocate to the north. So truly immense changes have occurred there, which present a series of challenges – for shipping and the logistics of shipbuilding, for example, and also for environmental protection, which will face huge challenges as a result. When an oil tanker sinks in the Arctic, then the resulting damage is far greater than when one sinks somewhere else – because the oil decomposes much more slowly in the cold waters. So this is an important issue that demands appropriate measures to avoid damage.

Conclusion: In the past five million years, the Earth has experienced significant temperature changes ranging from the ice ages to an Earth that has also been much warmer than it is today. Over the past 1,000,000 to 200,000 years, ice ages alternated with warm periods. We currently live in a warm period – and the next ice age will come eventually, that much is certain. But it will take a while – several thousand years. Our problems, however, are the next 100 years and a very large population. In this respect, the argument that the Earth has already looked different before doesn't help much. We have to find a way to cope with the next 100 years, and I have provided a few examples here that illustrate the major changes we are already experiencing. I can only emphasize once again that we absolutely must reduce carbon dioxide emissions now so we can still dampen the accumulation of carbon dioxide in the atmosphere to a tolerable level using acceptable measures.

We also have to start thinking of ways we can adapt. In that connection, I would like to say just a word about the regional character of climate change: we are only beginning to be able to say how strong the change will affect which regions. But there are areas on the Earth that will be affected far more severely than Northern Europe will be. I spoke earlier about the strong climate change that is predicted for the polar regions. Other “hot spots” include drought regions such as Northern Africa, Southern Africa and the Mediterranean Basin. Monsoon regions are also sensible areas, because when monsoon rain patterns change it has a tremendous impact on the people living there. That's why I am pleading for us to collaborate much more intensely with the emerging and developing countries: because that's where the need is the greatest.

Thank you!

Success Stories from Research for Sustainability

After the opening address and key note Michael Gleich interviewed three representatives of successful applications of sustainable research results. They talked about the innovative aspects of their projects and products.

Thermal wood modification – an ecological treatment process in terms of sustainable forestry



Lothar Clauder
Fachhochschule Eberswalde, Germany

Michael Gleich: Now I would like to ask my first guest to join me on stage – Lothar Clauder, good morning and welcome. You work at the University of Applied Sciences in Eberswalde and have a partnership with a wood processing company. Before we try to tie the overall climate situation to a specific product, I'd like to know how this partnership between a company and a technical university was formed in the first place. And what do you actually do?

Lothar Clauder: The University of Applied Sciences in Eberswalde was part of a research programme called "OakChain". That's one of 25 programmes that operate under the umbrella of sustainable forestry. The objective was to make it possible to record forest conversion – in other words, to record the current state and assess how to proceed in future from a climate change perspective. And it was precisely for this

reason that Holzindustrie Templin was also economically motivated to join this research programme.

Michael Gleich: So tell us then, what exactly is it that you do together with this company?

Lothar Clauder: The company came into play at the end of the 'OakChain' – specifically at the recycling stage. This involves innovative processing and recycling in the production of a product made from the small-diameter oak wood that will be generated in coming years through forest conversion.

Michael Gleich: Does everyone know what the term 'small-diameter oak wood' refers to?

Lothar Clauder: Small-diameter oak is wood that is harvested when thinning measures are carried out during the growth phase. So the question was: how can we make good use of this wood as a material? And that's how the cooperation began. Eberswalde and Holzindustrie used BMBF subsidies to install a test timbre drying chamber. This was used to develop a process, both in a laboratory-scale pilot unit at the university and on an industrial scale at Holzindustrie Templin.

Michael Gleich: What was the objective?

Lothar Clauder: The objective was to use this test chamber to develop a product, so-called "thermally modified wood". The technological properties of this wood have been altered. Holzindustrie wanted to use this product to launch an additional commercial activity.

Michael Gleich: Two questions: what is thermally modified wood and what is it good for?

Lothar Clauder: Thermally modified means that natural oak, depending on the process, is treated in a closed chamber with heat and in a oxygen-reduced atmosphere using a time-and-temperature-controlled multi-stage process that enhances the technological properties of the wood. I can't go into more detail here, as it also involves intellectual property rights.

Michael Gleich: What changes during the process? Why is the treated wood then better than natural wood?

Lothar Clauder: The process improves the durability of the wood, for example, protecting it against wood-destroying fungi and insects. It also minimises expansion and shrinkage, and thus wood movement. That's particularly useful for exterior applications – facades, windows, etc. Ultimately, of course, one might also use this product to try to undermine the commercial importance of tropical wood a bit.

Michael Gleich: Oh, I see – that means you're baking some kind of a tropical forest?!

Lothar Clauder: Yes, you might say that.

Michael Gleich: So when the oak is modified by means of this heat treatment then it actually acquires properties of tropical hardwood?

Lothar Clauder: Similar to tropical wood, that's right.

Michael Gleich: OK, but what about the energy balance? I mean, you might prevent tropical deforestation, but on the other hand you also have to modify the wood in a thermal process. So that requires large-scale heating – what does the overall energy balance look like?

Lothar Clauder: In fact, Holzindustrie Templin has already been very visionary by investing in an ORC process.

Michael Gleich: What's that? Is that a secret too?

Lothar Clauder: It involves extracting energy from sawmill waste and additionally purchased wood components in order to generate electricity. There's an oil-fired turbine. After the electricity-generating process, the temperature of the hot oil is still 280 degrees Celsius. That residual heat is used to heat various facilities, including the thermal wood production chambers. That means I have a system that is almost internally autonomous and I don't have to buy additional energy to run it.

Michael Gleich: What markets do you envision for a product like this? When the time comes, you'll want to market it properly, right?

Lothar Clauder: Yes, this wood could be marketed under a brand name, Greenwood for example, for outdoor applications such as urban furniture. I suppose many of the public benches in downtown

Hamburg are made of tropical wood: it would make sense to make them out of wood that has been locally grown and modified here.

Michael Gleich: Can you give us any figures on how much imported tropical wood could potentially be replaced through this process?

Lothar Clauder: It's really hard for me to give you a number. To my way of thinking, the more important aspect is what is being offered to the buyer who now has the choice between tropical wood and modified wood. As I said, thermal modification is also just one type of modification, and others produce other good products that can be used in place of tropical wood. The range is expanding and from a sustainability standpoint, you can say that it is possible to eliminate the use of tropical wood. You only have to present it to the customer in the right way – on a platter, and then they have the option to choose it or not. But I also have to say that the price of tropical wood is still too low at the moment.

Michael Gleich: Presenting it the right way is the key – where is it already available for sale?

Lothar Clauder: Directly from the producer.

Michael Gleich: Is it more expensive than tropical wood?

Lothar Clauder: The process raises the price, of course.

Michael Gleich: So tropical wood is less expensive?

Lothar Clauder: In some cases, yes. It depends on political conditions. Actually the price of imported tropical wood shouldn't be as low as it currently is. It's also that the quality of tropical wood isn't always consistent.

Michael Gleich: OK, we've still got some work to do there. But can we say that modified wood constitutes a product of consistent quality because it has been treated under standardised conditions?

Lothar Clauder: Right. That was also one of Holzindustrie Templin's goals. Over the course of the project's long timeline, they managed to standardise this product to a great extent. And now in the crisis they've found that increasing thermal wood sales

could at least partially compensate for downturns in other revenue streams.

Michael Gleich: Are they happy now? Is Holzindustrie happy about an innovation like this, or do they say: “What a waste!”

Lothar Clauder: We are currently cooperating on a follow-up project that deals with the quality assurance of the products and I think that this is proof enough that the work continues and that Holzindustrie was very satisfied with our collaboration, also within the framework of the overall research programme.

Michael Gleich: One last question for you: when a technical university like this works together with a company, it involves completely different partners with different kinds of expertise and different mentalities. What sort of problems do you have to expect with a partnership like this?

Lothar Clauder: It takes a lot of courage, because you have to show your cards and neither side really likes to do so.

Michael Gleich: That means it really requires trust?

Lothar Clauder: Trust is essential, there’s no question about that. And collaboration is based on mutual give and take, of course.

Michael Gleich: Excellent. Thank you very much Mr. Clauder!

Efficient heating technologies for climate protection – promeos connects innovation with social responsibility



Dr. Ing. Jochen Volkert
promeos GmbH, Germany

Michael Gleich: Our next guest is chemical engineer Dr. Jochen Volkert. You are a shareholder and managing partner of promeos – what gave you the idea to establish a company?

Jochen Volkert: I got the idea when I was working on my engineering doctorate in fluid mechanics at the University of Erlangen-Nuremberg. One of the areas of study under the departmental chair involved basic research into the development of a new fundamental technology in the field of combustion engineering. That work took place right next to my own laboratory, and I seized the opportunity to take that basic technology and build a company out of it.

Michael Gleich: Take means steal, right?

Jochen Volkert: No, of course not! But that was several years ago now and when you know how technology transfer works at universities and how to handle this sort of thing – in certain cases, at least – then it was indeed still a bit of a struggle in those days to overcome structural resistance within the university hierarchy. Things are somewhat different today.

Michael Gleich: The professor at the time was in agreement?

Jochen Volkert: He gave his full support in the matter and is now a Promeos shareholder. Any lingering hesitation he may have had was finally swept away when those big cheques started rolling in from the venture capital investors.

Michael Gleich: So please tell us then, what is it that you actually do?

Jochen Volkert: We are revolutionising combustion. That means we are replacing conventional combustion with a flame-free alternative. The way we burn material today – in all industrial processes – is fundamentally wrong. You can barely regulate combustion, you create inhomogeneities and you actually ought to build boilers like an accordion, as the flame even alters length with its efficiency. And that's exactly what we are replacing. I don't have a burner with me here, but let's take a look at this lamp: when we fire up a burner, then the light goes on. There's no flame, it generates only radiation and very, very homogeneous, precisely controllable waste gas heat.

Michael Gleich: And what have you developed, this burner?

Jochen Volkert: That's what we have developed. Initially this required material development, which means we developed and qualified high-temperature ceramics that can withstand these conditions. And then we used those new materials to develop serial production burners. Today we are a manufacturer of special thermal process heating equipment. That means we supply the production industry with special heating systems that generate the corresponding customer benefits, e.g. tremendous energy savings.

Michael Gleich: That's the keyword, of course – how much energy do you save, how much can you reduce the impact on the climate, and also how much money can you perhaps save by implementing your technology at a company?

Jochen Volkert: With the systems that we have supplied over the past three years, we have reduced gas consumption by at least 25 percent. Today we supply systems that save up to 70 percent. Here's one example expressed in CO₂: if you supply a one-megawatt system and save 50 percent there – as we do with large transfer ladles for the steel and aluminium industry – then at 8,000 operating hours per year

that saves about 1,000 tonnes of CO₂ equivalent each year – in one plant.

Michael Gleich: How long does it take to amortise this – because first you have to invest something up front?

Jochen Volkert: For all systems, within twelve months – except a few very big units, where it can take as long as 18 months. But it can also take as little as three or four months.

Michael Gleich: So the customers must be running to you in droves, then, right?

Jochen Volkert: Well, not exactly. If you're familiar with product launch cycles in serial production processes, then you know that it unfortunately doesn't work quite like a software product that takes off on a hockey stick trajectory within the first two years. Instead, of course, we always operate within serial production processes. When I waltz into the foundry at an automotive supplier, for example, and say: "My name is Volkert and I've got just the burner you need!" and his customer had just been there the day before explaining to him that he has to justify one defective part per million pieces produced, then the barrier to entry into such serial production processes is obviously fairly high. So the launch cycles are 12 months, 18 months, etc.

Michael Gleich: How much research still goes into what you do?

Jochen Volkert: We still perform research ourselves. That means, of course, that we are improving our systems. In some cases this goes on behind closed doors, but we also have joint projects with scientific institutions. It depends to a large extent on the topic, but we do participate, for example, in research consortia that work on fuel cells, hydrogen combustion and special gases. We also burn other fuels beside natural gas and liquefied gas: we burn bio-gases, special gases, pyrolysis gases and also even pure hydrogen when necessary – and that obviously requires intensive research efforts.

Michael Gleich: The people who propose completely new technologies are the ones who are especially trendy and attract lots of attention and headlines. And then you come along with classical efficiency increase – does it anger you that you're then sometimes

overshadowed by those ingenious inventors?

Jochen Volkert: Well, yes, actually it does – because when you look at the efficiency potential of pure substitution of an old burner for a new burner, then you're able to achieve significant savings potentials much, much faster than with new technologies. But I don't see enough of this energy and material efficiency-driven approach around. There's a whole lot more potential there than most people think. Let me tell you another story: A few weeks ago I had various politicians visiting us at the company and I found out that they were actually of the opinion that the production sector, i.e. major industry – whether steel, aluminium, the automotive industry, glass, plastics or the food industry – had essentially already exhausted the efficiency potential of conventional systems. The politicians also told me that the huge energy guzzlers like the steelworks could hardly save any more energy. I think there's so much potential left that the political system should be compelled to create incentives there, because the potentials are huge.

Michael Gleich: Who's taking this down for the State Secretary? Good, someone's taking notes – OK. One last question, you've been very successful ...

Jochen Volkert: ... I sure have ...

Michael Gleich: ... at raising a big family – Mr. Volkert has four children, as a matter of fact, and this has had an impact on the way he runs his company. There are three dimensions of sustainability: the ecological, the economic and also the social component. You received an award for family-friendly management. What exactly was this for and who awarded it to you?

Jochen Volkert: It was presented to me by the German Minister of Family Affairs, Ms. Ursula von der Leyen. We are the family-friendliest company in Germany with less than 50 employees. It came to us somewhat out of the blue, as we actually didn't plan it this way as part of any marketing strategy. I'm married to a freelance midwife, and if you know what kind of hours a midwife keeps, then you know that the scheduling has to be extremely flexible. So I've had to grant myself certain privileges, such as bringing my children with me into the office and putting them on the secretary's desk, for example, or just staying at home once in a while. And when you see what incredible benefits it brings when your

working hours are organised flexibly, then of course you also grant this privilege to all of your employees. With that as our starting point, a corporate culture has evolved that actually encompasses the full range of needs. And the employees with children are not the only ones who benefit. One of our office corridors spans four generations, for example, where a 17-year-old trainee and a 73-year-old woman handle the bookkeeping. Their interests are fundamentally different from those of us with family responsibilities of our own – and there too we're finding solutions, right along with ones for single-parents or people on parental leave. I think there's no reason anymore not to address the interests of employees today. Rather, the company reaps the benefits, as these employees generally don't work less, but more.

Michael Gleich: Long live the flexible medium-sized company! Thank you very much Dr. Volkert.

Water Franchise – Local Solution for the Global Need



Prof. Dr. Dr. Karl-Ulrich Rudolph

Prof. Dr. Dr. K.-U. Rudolph GmbH, International Water Consultants, Germany

Michael Gleich: As our third guest, I would like to welcome Professor Karl-Ulrich Rudolph to discuss water. You are an international water consultant – perhaps you should begin by explaining to us what that means?

Karl-Ulrich Rudolph: Our consulting firm, International Waterconsultants, basically grew out of research activities and its unique selling point lies in the combination of water engineering and water economics. I should actually say “water management”, but the term water management is already taken: in particular, technicians use it without really thinking about “true” economics. And it’s this juncture between engineering and economics that is so exciting in the water sector. My father was an auditor, not an engineer. Like many sons at that age, I set out to become something other than what my father was, so I first studied engineering and then later went back and earned my degree in business. With that background, it’s only natural to address the question: “How can it all be financed, both in the field of water and in the field of climate protection?”

Michael Gleich: So it’s about engineering and money?

Karl-Ulrich Rudolph: About engineering and economics, because economics is more than just money. I can buy some things without laying cash on the table. Especially when it comes to the climate or water, what you can measure monetarily isn’t usually the main point.

Michael Gleich: Does South Africa really have limited water resources, or is it a country where water shortages are created for reasons that have nothing to do with the natural conditions?

Karl-Ulrich Rudolph: There’s a saying: “It’s not water resources that you lack, it’s water management.” It’s true, and it also applies to countries that, by comparison to Germany, suffer from water shortages. At least it applies wherever water is not produced intelligently, distributed efficiently and used reasonably. And it applies in the many regions of the world where 50 to 60 percent of water is lost in the water supply lines. Ultimately it has to do with management, specifically with the management of high-tech and efficient technology and with what’s now known as “good governance”. You can’t really separate all these things in engineering and economics.

Back then within the context of Integrated Water-resources Management (IWRM) research, South Africa was selected as a target region, and we were of the opinion that the critical success factor, that is to say the bottleneck, is neither new technology nor what the donor banks do in capacity building programmes, but rather the bottleneck is actually the operative water management on the small, local scale.

Michael Gleich: Why do the South Africans need someone from Germany?

Karl-Ulrich Rudolph: Initially we wondered about that, especially inasmuch as our scientific partners do a great deal of research themselves with the national Water Research Commission and are very well-funded. But many things are missing that we can contribute from Germany. I was already involved in South Africa before, in the construction of water plants with Steinmüller and also in developmental cooperation. I was familiar with the region. To my way of thinking, South Africa is an extremely interesting partner country. They have water plants there that surpass nearly everything that we know from Germany – nearly everything, but not quite – so I

mean genuine high-tech, but they also have some very, very archaic aspects of an elementary level developing country. Within that balance, you can perform extremely interesting and relevant work in practical and application-oriented research.

Michael Gleich: What was your basic approach to improving water management in South Africa?

Karl-Ulrich Rudolph: We started out with the keyword “local service providers”. Because in South Africa, it is no different than in almost every other country in the world: when you have a very complex project financed by a bank or one for which a city invites public tenders, then you quickly realize that you cannot carry out this complex project reliably with any local company based in that country – the construction of a waste water recycling plant on a major scale, for example, or the operation of complex, decentralized systems – and local project financing is absolutely out of the question. In many countries, such contracts are only awarded to major international players. And it has to be that way, as only companies such as these have adequate capacities and the practical expertise. Unfortunately, this means that the smaller places, the rural areas, are entirely ignored, because the global players concentrate on Johannesburg, Cape Town, Pretoria and maybe Durban, but not on the rural areas in the Olifant River Basin or in KwaZulu-Natal. They go to Moscow or St. Petersburg, but they just don’t bother with the rural areas anymore. So there’s a real lack of water management and skilled providers.

Michael Gleich: And now what about your idea:

Karl-Ulrich Rudolph: Our idea was that we can only manage water if we create a local business. So we don’t simply believe in the goodness of people, but we say that when the whole thing is supposed to work sustainably then it also has to be worth the effort. Sustainability, from an economic perspective, is only achieved when it “pays off” for the players over the long term.

Michael Gleich: Is this the famous privatisation of water supply plants?

Karl-Ulrich Rudolph: No, quite the contrary: it is not the famous / infamous version with major foreign corporations. This is more of an alternative to that. We said, in lieu of the international player who then

selects a local subcontractor, we’ll turn it the other way round. Usually the international global player wins the contract and the local player or players are merely subcontracted. But the latter eventually end up having to do most of the work, and are often dissatisfied as a result – no less so than their client, the local government for example, which, as a general rule, would much rather have awarded the contract locally.

Michael Gleich: A subcontracted water works?

Karl-Ulrich Rudolph: Yes, it usually works something like this: the engineering comes from Germany, for example – which is a good thing and should also continue – but it’s really just the blueprints for engineering with the core technology. The lion’s share of the project involves construction services and simple engineering, and that work is distributed to many individual local companies. Then the local government, which is usually overloaded and rarely up to the task, has to operate the entire thing later on. As soon as the German project engineer leaves, things often simply collapse. It’s amazing how many plant cadavers there are out there, especially in the developing countries of Africa – expensive plants that very quickly break down and grind to a halt.

Michael Gleich: And is the water business profitable for the local provider now?

Karl-Ulrich Rudolph: We said that we’re simply turning things the other way around: the local companies should become the contractors. But they do not possess the required know-how and the capacities, so they should outsource them by entering a so-called franchise agreement – a franchise contract with an international player. That means they acquire know-how and capacities and ultimately they also procure a business model and the financing capability.

Michael Gleich: We all know one franchise – McDonald’s – so that means the McDonaldisation of the water business goes something like this: know-how is provided, a license, etc, but the control remains in the hands of the local water authorities?

Karl-Ulrich Rudolph: The quality management is monitored by the franchisor. If you’ve ever washed your hands at a McDonald’s after your meal, then you know that there’s always that nice list posted there with the names of the last people who cleaned; they

have to formalise little things like that, of course, because otherwise they can't keep a complicated water system running in many countries. The example of McDonald's also shows that this business model lets you multiply rapidly without your having to fund everything with local equity. That would really eliminate bottlenecks in many corners of the earth: bottlenecks caused by the fact that the local authorities do not want international players running things or cannot pay them while the local players lack the management know-how and the requisite capital resources. By the way: Hilton Hotels are also a franchise system. So there are also high-quality franchises in the premium segment.

Michael Gleich: Which brings me to my next question: can the programme that you successfully implemented at Olifants River be carried over into many other countries?

Karl-Ulrich Rudolph: Well I'm really proud to report that our pilot project area is one of the 22 water supply areas in South Africa that have now received the Blue Drop.

Michael Gleich: Blue Drop – what's that? Is it something like an Oscar?

Karl-Ulrich Rudolph: More like Germany's "Blue Angel" environmental quality seal perhaps. The Blue Drop is an award designed to recognise producers for their good water quality. Whether our water is the best of all, I can't say, but only 22 out of 485 water supply areas received recognition, and "our" water provider with our BMBF project was one of the few providers chosen. That shows that the franchise concept works, because the local operator on site is responsible. And when something goes wrong, then the water customers – his neighbours – come and complain. So the entrepreneur responsible is not located in Paris or London or any other distant place, but rather he is available right there locally.

Michael Gleich: One last question: how about transferability?

Karl-Ulrich Rudolph: Personally, I believe that we'll also find an application for franchises in Germany. Of course our municipal operations and public utilities have a good level of technical competence. But there is now a trend here toward reversing the tide of privatisation that was fashionable in the past

few decades, and this trend should not be allowed to result in a relaxation of professional standards. When every small town now goes back and says, "I no longer wish to be a part of the major corporation," or "I no longer want to be dependent on my big public utility," and prefers to be autonomous, then we can't let this create a situation where every mayor then believes they are able to operate their own water works. Parish-pump politics like that can become expensive. That's why I believe that there are also good prospects in Germany for franchises as an alternative to the consolidation of small municipal public utilities within larger corporations.

Michael Gleich: As a follow-up to the last question, there's still one "final" last question – will it be expensive for us when a franchise appears somewhere? Will we all pay more for water then?

Karl-Ulrich Rudolph: I don't think so, because the potentials for efficiency increases are also tremendous: I estimate them to be another three-and-a-half times more than the energy savings potential in the steel industry that the speaker who preceded me cited.

Michael Gleich: Thank you very much, Professor Rudolph.

The International Green Talents Competition 2009 of the Federal Ministry of Education and Research



Introduction and Impressions – Award Ceremony

During the opening session, State Secretary Prof. Frieder Meyer-Krahmer presented the “Green Talent Award” to 15 young scientists from across the world. In 2009 the award was offered for the first time to outstanding scientific talents whose research is making a long-term contribution to resolving global challenges such as climate change, diminishing energy resources and large-scale environmental pollution.

156 young scientists from 43 countries applied for the competition. The winners were invited by the Federal Minister of Education and Research Prof. Annette Schavan, the patron of the competition, to visit some of Germany’s best-known environmental technology venues.

The “Green Talents” were shown around German universities, research institutions and companies involved in projects spanning various areas of technology, including fields such as global climate change, cleansing contaminated land, processing water and wastewater, and researching new fuels based on biomass and photovoltaics. The sixth BMBF Forum for Sustainability represented the culmination of the “Green Talents Forum”.

International Dialogue on Science for Sustainability (D4S)



Launch of the website

On the occasion of the 6th Forum for Sustainability, State Secretary Prof. Frieder Meyer-Krahmer and five outstanding "Green Talents" from Brazil, Russia, India, China and South Africa symbolically launched the BMBF's new "Dialogue for Sustainability (D4S)" website: www.dialogue4s.de

The dialogue series on sustainability research "Dialogue for Sustainability" or "D4S" with Brazil, Russia, India, China and South Africa has the aim of developing and expanding international cooperation in different areas of research, including climate protection, land use, water, energy and environmental technology. Several interministerial agreements in this area have been concluded in the last two years, and the most important results have now been published on this website. With its "Dialogue for Sustainability", the BMBF wants to contribute towards solving global challenges by working together with emerging economies.

Session Programme

6th BMBF Forum for Sustainability

A – Global Responsibility

■ A1 Not to be Built on Sand – Good Practice Examples from BMBFs Future Megacities Programme

Date: 09/09/2009
Time: 14:30 - 16:00

BMBF's research focus on "Future Megacities" (2004-2013) is part of the German Federal Government's engagement to support the introduction of technical and non-technical innovation for the development of adaption and mitigation strategies in newly industrialising and developing countries. Bilateral, transdisciplinary research teams from Germany and their partners from future megacities in 8 countries aim to establish energy- and climate-efficient structures in these cities. Cities are looked upon as systems; the teams take an integrative research approach. The teams are not only faced with topical challenges but also with those of research management over great distances, within various cultural settings and different scientific traditions. The presentations explain the latter challenges from practical examples. They address an audience that takes an interest in establishing complex research projects. An open discussion is to follow the presentations.

Session Moderation

KOCH-KRAFT, Andrea
Project Management Agency – part of the German Aerospace Center, Germany

Presentations

HERTZ, Tilman
Humboldt University of Berlin, Germany

SCHÄFER, Rudolf
Technische Universität Berlin, School VI: Planning – Building – Environment, Chair for Building and Administrative Law, Germany

SESSION RESULTS

Research priority areas for the foreseeable future

- Research should be solution-oriented, tailored to user requirements and aim at people's needs.
- The approaches should be more integrative and transdisciplinary.
- It is necessary to become even more aware of the actual and upcoming challenges and to handle them.
- It is important to employ man-power from the particular region.
- Greenfield construction plans should consider by now future population developments and needs.
- Blueprints may fail, individual local peculiarities must be considered.

Necessary framework conditions to foster sustainable innovation

- The population has to be integrated (with sensitivity and an appropriate dialectic).
- Less bureaucracy could be useful.

■ A2 Green Talents – International Forum for High Potentials in Green Technologies

Date: 09/09/2009

Time: 16:30 - 18:00

Four winners of the BMBF Green Talents competition will introduce their research activities in the field of environmental technologies. Coming from different countries they will enhance the international perspective of this research area.

Session Moderation

LOSKILL, Renate
Federal Ministry of Education and Research, Germany (BMBF), Germany

Presentations

International Dialogue on Science for Sustainability
MENNICKEN, Lothar
International Bureau (IB) of the Federal Ministry of Education and Research, Germany

Winner of the Green Talents Competition 2009 – Biological systems engineering
GÜNGÖR, Kerem
Abant Izzet Baysal University, Turkey / University of Wisconsin-Madison, USA,

Winner of the Green Talents Competition 2009 – Sustainable management in the chemical industry
ARISTEIA DE LIMA, Juliana
State University of Campinas, Brazil

Winner of the Green Talents Competition 2009 – Water and wastewater treatment
SAMAL, Nihar
National Institute of Technology Durgapur, India

Winner of the Green Talents Competition 2009 – Fuel cells and the use of biomass as a renewable energy source
CAETANO DE SOUZA, Antonio Carlos
São Paulo State University, Brazil

SESSION RESULTS

Research priority areas for the foreseeable future

- The establishment of a global sustainability funds emerges as a suitable approach to concentrate on central sustainability areas such as climate change, energy production, biofuels, etc.
- There is a need for a holistic approach in research, but one has to give a chance to the development of new technologies and to push them where suitable.

Necessary framework conditions to foster sustainable innovation

- Sustainable innovation can be fostered through enhanced international sustainability cooperation and sustainability dialogue between countries.
- The launch of a network of communicating researchers and the establishment of joint working groups on the thematic represent a suitable framework to foster sustainable innovation processes.

Necessary framework conditions to foster sustainable innovation

- How can scarce resources be made available and accessible for the population?
- The presentations concentrated on topics how to combine political activities with the practice of science.

■ A3 GLOWA – more than a Drop in the Bucket

Date: 10/09/2009
Time: 09:00 - 10:30

Securing an adequate supply of qualitatively good water is one of the mayor challenges of our future. Added to this is the risk posed to water availability by large-scale climate and land use changes that have a significant impact on the global and regional water cycles. This leads to a series of new challenges concerning sustainable water management concepts.

To meet these challenges, the BMBF launched its program GLOWA (Global Change and the Hydrological Cycle) in 2000 with five projects in Europe, Middle East and Africa. The objective of these projects is to develop, test and apply new integrative, interdisciplinary methods and models which will contribute to a long term sustainable water management at local and regional scales, taking into account global environmental changes and socio-economic conditions.

The projects are in their third and final phase, the implementation phase and have each been running for altogether nine years.

Session Moderation

WECHSUNG, Frank
Potsdam Institute of Climate Impact Research/PIK,
Germany

Presentations

GLOWA Africa Projects: Sustainable?

REICHERT, Barbara
University of Bonn, Steinmann-Institute of Geology,
Germany

Capacity Building in the GLOWA Volta Project

LIEBE, Jens
Center for Development Research/ ZEF, University of
Bonn, Germany

Linking scenario development and simulation to support water policies under climate change in the Jordan River basin

ONIGKEIT, Janina
Center for Environmental Systems Research, University of Kassel, Germany

Regional climate scenarios for the Jordan river catchment as a basis for studies of future water availability

FORKEL, Renate

Institute for Meteorology and Climate Research –
Atmospheric Environmental Research (IMK-IFU)
Garmisch Partenkirchen, Germany

SESSION RESULTS

Research priority areas for the foreseeable future

- Extension of the projects which already have a great deal of experience on the ground in a long term sustainable water management at local and regional scales. Create a sense of ownership and acceptance at all levels in the project regions
- Closer interaction and cooperation with stakeholders in the regions (especially in the Middle East and Africa). A stable political cooperation at all political levels is needed to achieve this.

Necessary framework conditions to foster sustainable innovation

- For better resource management, integrative interaction and intensive cooperation between all the stakeholders involved are needed to foster sustainable development.
- To increase the research capacity and to implement changes a data pool and the use of freely-available software supports the development of transparent projects.

Necessary framework conditions to foster sustainable innovation

- Local stakeholders are interested in inputs on climate change at the local level.
- PhD students from the project countries who return after their project has finished provide valuable input to national institutions in their home countries.
- Impacts of climate change at the local and regional level have been increasing for years, leading to a shortage of resources (first and foremost water in Africa and the Middle East).

■ A4.1 Integrated Water Resources Management – Sustainable Development with Education

Date: 10/09/2009
Time: 11:00 - 12:30

IWRM is a process which promotes the coordinated development and management of water, land and related resources, in order to maximize the resultant economic and social welfare in an equitable manner without compromising the sustainability of vital ecosystems. (Global Water Partnership 2000). A sustainable behaviour with water resources requires the development of appropriate strategies, concepts, measures and site-specific technologies. For the successful implementation at the end of the R&D-project also locally education and training courses are needed. The IWRM-Session FONA-Forum Hamburg 2009 will introduce relevant aspects of education for the IWRM process, current and futures needs will be discussed with experts.

Session Moderation

HÖCKELE, Verena
Forschungszentrum Karlsruhe, Projektträger Forschungszentrum Karlsruhe, Germany

Session Discussion

CULLMANN, Johannes
IHP/HWRP-Sekretariat – International Hydrological Programme (IHP) der UNESCO, Hydrology and Water Resources Programme (HWRP), Bundesanstalt für Gewässerkunde, Germany

HEIDEBRECHT, Rüdiger
DWA Deutsche Vereinigung für Wasserwirtschaft, Abwasser und Abfall e.V., Germany

HÖTZL, Heinz
Karlsruhe Institute of Technology, Germany
PARISIUS, Cornelia
Internationales Büro des BMBF, Germany

Presentations

Vom Schulcurriculum zum Doktorandenprogramm: Bildung als Instrument zur nachhaltigen Implementierung von IWRM-Komponenten in Jordanien, Palästina und Israel (SMART-Projekt)
VAN AFFERDEN, Manfred

Helmholtz Centre for Environmental Research – UFZ, Germany

Forschung zur nachhaltigen Nutzung der Land- und Wasserressourcen in der Region Khorezm, Usbekistan: Die Ausbildungskomponente

MANSCHADI, Ahmad M.

Center for Development Research (ZEF), University of Bonn, Germany

Capacity-Building als Grundlage nachhaltiger IWRM-Konzepte am Beispiel IWRM-Indonesien

NESTMANN, Franz

Universität Karlsruhe (TH), Institut für Wasser und Gewässerentwicklung, Germany

SESSION RESULTS

Research priority areas for the foreseeable future

- Transfer of approaches and results of ongoing projects to other regions is a tremendous challenge. The local conditions (economic, ecologic, stakeholders) always need to be considered carefully.
- More transdisciplinarity: different stakeholders have to be increasingly integrated into a research community network.

Necessary framework conditions to foster sustainable innovation

- The integration of young researchers into international research projects.
- Technology transfer and support to implement project result at the regional level.

Other important issues or topics discussed during the session

- Vocational training and education as an additional part of the educational chain including advanced education and qualification, universities and schools.
- Due to the improvement of the water management the situation of the women was discussed as an important part of the chain in water supply in the regions of the Middle East, Central Asia and Indonesia.

■ A4.2 Geotechnologies and Earth System Research

Date: 10/09/2009
Time: 11:00 - 12:30

The devastating consequences of natural disasters, the global climate change and the intensive utilisation of natural resources present enormous challenges to politicians and scientists. Sound concepts and solution approaches can only be developed if we understand the Earth as a system connecting all natural processes in a complex way. Thus, engineering, natural and social sciences have to be interlinked and public research has to collaborate with the private sector. This could form the basis for a global "Earth System Management". In this session two current key issues will represent the transdisciplinary Earth System Research funded by BMBF: Integrated Solutions for Preventing Natural Disasters exemplified by the Tsunami Early Warning System for the Indian Ocean and Innovative Technologies for reducing anthropogenic CO₂-Emissions – What can the geological storage of CO₂ contribute? – Chances and Risks.

Session Moderation

STROINK, Ludwig
Head GEOTECHNOLOGIEN Coordination Office,
Germany

Panel Discussion

Wenn man schon CO₂ lagern muss, dann aber bitte so sicher wie möglich!

SCHILLING, Frank R.
Karlsruhe Institute for Technology, Germany

CCS und Umweltschutzgüter – eine Risikoabwägung

DAHMKKE, Andreas
Institut für Geowissenschaften, Christian-Albrechts-Universität zu Kiel, Germany

Ergebnisoffene Erforschung der Chancen und Risiken der CO₂-Speicherung – Die Pilotprojekte CO2SINK und CLEAN

KÜHN, Michael
Zentrum für CO₂-Speicherung, Helmholtz-Zentrum Potsdam, Deutsches GeoForschungsZentrum - GFZ, Germany

Presentations

Das Deutsch-Indonesische Tsunami Frühwarnsystem – eine wissenschaftliche, technische und kulturelle Herausforderung

LAUTERJUNG, Jörn

Helmholtz-Zentrum Potsdam, Deutsches GeoForschungsZentrum GFZ, Germany

SESSION RESULTS

Research priority areas for the foreseeable future

Topic 1: Tsunami Early Warning System

- Monitoring, Modelling (especially regarding the risk of the second reflected waves), Mitigation, Capacity Building
- Organisational and structural strategies for the avoidance of danger/catastrophes after the first alert, Keyword: "Last-Mile"
- Information of the population concerning the importance of the early warning systems in order to protect this infrastructure from damage.

Topic 2: Geological storage of CO₂

- Further risk analysis; Weighing of all chances and risks; "Subsurface interventions are always bearing risks"
- Existing research activities
- CCS may perhaps only be an interim solution, therefore research on the topics of savings potential, energy efficiency and renewable energies must have at least peer-to-peer priority

Necessary framework conditions to foster sustainable innovation

Topic 1: Tsunami Early Warning System

- Involving the local media is absolutely necessary to achieve participation and acceptance by the local population.
- Training and integration of local experts in order to build up skills for the autonomous operation and continuous evolution and development of the systems. (Training on the job)
- Rapid forwarding of information between countries and institutions within the warning chain.

- Willingness to cooperate of all countries bordering the endangered region

Topic 2: Geological storage of CO₂

- Improvement of public relations; strengthening the objective discussion through information and education, “de-emotionalisation” of the CCS-debate
- establishment and operation of pilot and demonstration sites

Other important issues or topics discussed during the session

Topic 1: Tsunami Early Warning System

- A general problem of the precaution against natural hazards is to keep the hazard awareness and risk consciousness in the population permanently awake. Only then protective measures and risk-minimising precaution (e.g. in the building sector) can be effectively implemented and come into effect.

Topic 2: Geological storage of CO₂

- It is necessary to adopt the national law on CCS, in order to create a generally valid statutory framework
- With the development and demonstration of CO₂ capture and storage systems Germany enables itself to reach a successful position on the future market “climate protection technologies”.

B – Innovation for Climate and Resources

■ B1 Development, Diffusion and Impacts of Sustainability Innovations

Date: 09/09/2009
Time: 14:30 - 16:00

The guiding principle of sustainability demands long-term and far-reaching changes in technology, infrastructure, lifestyles and institutions. Innovations and their diffusion are expected to provide vital stimulus for managing sustainability. Economic and sociological research conducted in this thematic field to date still exhibits a number of key deficits: for example, various interesting concepts continue to exist side-by-side but largely isolated from one another. Further, the connection between the development of economic theories and their empirical implementation is still relatively loose. In this session, the results of the research projects “Social-ecological Research” and “Economics for Sustainability” are presented and discussed that aim at a better foundation of economic theories of sustainability innovations by empirical work. The projects analyze the creation, diffusion and implications of sustainability innovations both with the focus on enterprises and on the demand side (energy use in households). In addition, the importance of sustainability innovations within the catching-up processes of threshold countries is examined.

Session Moderation

HORBACH, Jens
Anhalt University of Applied Sciences, Department Economics, Germany

Presentations

Entstehungspfade von Nachhaltigkeitsinnovationen
FICHTER, Klaus
Borderstep Institute for innovation and sustainability, Germany

Marktforschung für nachhaltige Innovationen mit Hilfe von Discrete Choice Experimenten
HEINZLE, Stefanie
Good Energies Chair for Management of Renewable Energies, Suisse

Umwelt- und Nachhaltigkeitsinnovationen – Erkenntnisse einer top-down Betrachtung
RAVE, Tilmann
Ifo Institute for Economic Research – Department Environment and Transportation, Germany

Die wirtschaftliche Perspektive von Nachhaltigkeitsinnovationen aus Sicht von Emerging Economies
WALZ, Rainer
Fraunhofer Institute for Systems and Innovation Research, Germany

SESSION RESULTS

Research priority areas for the foreseeable future

- A better connection of different research methods (case studies and econometric methods) should lead to overcome data restrictions.
- Different data bases should be better connected as well. Introduction of panel databases and more demand and consumer oriented analyses.
- A stronger focus on the interaction between ecological, economic and social consequences of eco-innovations.

Necessary framework conditions to foster sustainable innovation

- Better political framework and research framework for combining social ecology and economic development.
- Provisions for technology transfer are foreseen to integrate sustainability innovations into the catching-up process for emerging economies (better absorptive capacity and functioning innovations systems).

Other important issues or topics discussed during the session

- The relationship between sustainable and environmental innovations.
- The specialization of the emerging economies as a precondition for further development of the sustainability innovations (e.g. wind power stations).

■ B2 Adaptation to Climate Change on a regional Level

Date: 09/09/2009
Time: 16:30 - 18:00

Based on “KLIMZUG – Klimawandel in Regionen zukunftsfähig gestalten” (Managing climate change in the regions for the future), the new supportive measure of the Federal Ministry of Education and Research, several approaches to the adaptation to climate change on the regional level will be presented at this workshop. The development and enhancement of networks between stakeholders from the science and business as well as from politics and administration, is here of essential interest. The focus is also put on trans-sectoral networks with diversified competences, opposed to single-sector interactions (as for example in agriculture, the water management or urban development). However, an intensified exchange among different sectors is not the only focal point of the workshop. In fact, solutions are to be found that comprise the innovative potential which is indispensable concerning the chances and risks of climate change.

Session Moderation

MAHAMMADZADEH, Mahammad
Institut der deutschen Wirtschaft Köln, Germany

Presentations

Regionale Anpassung an die Klimafolgen
MAHAMMADZADEH, Mahammad
Institut der deutschen Wirtschaft Köln, Germany

Regionale Anpassung an die Klimafolgen
BIEBELER, Hendrik
Institut der deutschen Wirtschaft Köln, Germany

Regionale Netzwerkbildung am Beispiel der Ernährungswirtschaft in der Metropolregion Bremen-Oldenburg
PFRLEM, Reinhard
Carl von Ossietzky Universität Oldenburg, Germany

Technologische Anforderungen zur Anpassung an den Klimawandel am Beispiel der Metropolregion Hamburg
PASCHKE, Erik
Technische Universität Hamburg-Harburg, Germany

SESSION RESULTS

Research priority areas for the foreseeable future

- Increased networking
- Technological arrangements for adaptation
- Improving governance structures and strategies for innovation
- Urgent enhancement of the interpretation of climatic data

Necessary framework conditions to foster sustainable innovation

- Increased practical relevance and solution orientation
- Stronger cooperations between economy and research
- Interdisciplinary cooperations

Other important issues or topics discussed during the session

- Overall strategy for coping with conflicts of interest between the various sectors
- Milestone criteria
- Role of research
- Role of mass media / dialogue with and integration of the residents
- Quality and persistence of networks
- International learning effects

■ B3 Biorefineries for the Future

Date: 10/09/2009

Time: 09:00 - 10:30

Because of the limited fossil resources and the increasing demand for energy the use of biomass and biorefineries becomes a more and more attractive alternative for the future. The cascading concept of combined co-production of a spectrum of bio-based products and energy from biomass is most promising. Through the efficient conversion of biomass (plants, waste biomass) as feedstock a biorefinery can take advantage of the differences in biomass components and intermediates and maximize the value derived from the biomass feedstock. Integrated biorefineries produce a variety of products, with the main focus on producing biofuels, materials and chemicals which are often intermediates for further conversion processes in conventional industries. Continued research and technological development in the areas of feedstocks, conversion processes and product diversification enable more economical, social and environmentally sustainable options for integrated biorefineries for the future.

Session Moderation

WANDREY, Christian
Forschungszentrum Jülich GmbH, Institut für Biotechnologie 2, Germany

Presentations

Bioraffinerie2021: Konzepte und Technologien für die Bioraffinerie der 2. Generation

ANTRANIKIAN, Garabed
Hamburg University of Technology, Institute of Technical Microbiology, Germany

Biokraftstoffe und chemische Produkte aus Biomasse

RARBACH, Markus
Süd-Chemie, Germany

Nachhaltige Nutzung nachwachsender Rohstoffe – Das Chemisch-Biotechnologische Prozesszentrum – CBP in Leuna

WOLPERDINGER, Markus
InfraLeuna GmbH, Germany

Bioraffinerie: Biomasse-Konversion für nachhaltige und wettbewerbsfähige Chemikalien

FREYER, Stephan
BASF AG Deutschland, Germany

SESSION RESULTS

Research priority areas for the foreseeable future

- Diversification of the chemical industry's raw material input – carbon or biomass might become substitutes for the predominant raw material oil. The utilisation of resources as raw materials rather than mere energy sources calls for an implementation of biorefineries.
- Acceleration of examples for products which can be used in more than one way
- Optimising the cultivation of biomass has to be an essential part of the overall concepts – focussing on non-food biomass to avoid competition with food and forage sector.
- Improvement of the mechanical, chemical, enzymatical digestion of non-edible biomass

Necessary framework conditions to foster sustainable innovation

- Fostering partnerships between science and industry.
- Research should try and copy nature – as the company "nature" has been running successfully since 2 billion years
- Improving the communication of success stories of white biotechnology as success partly relies on a good documentation and dissemination of promising results. (e.g. DPWP)

Other important issues or topics discussed during the session

- Research on biorefineries reached an important interim goal when the chemical industry became aware of biorefineries, took them serious and finally offered ambitious funding.
- Principle of sustainability should be transferred to more areas of life with bigger emphasis on its importance. People have to be shown examples for the significance of sustainability in everyday life.

A – Global Responsibility / B – Innovation for Climate and Resources

■ A5/B5 Coherent Innovation Policy – Framework Conditions for Green Lead Markets

Date: 10/09/2009
Time: 13:30 - 15:00

Environmental technology emerges as a future growth market. Almost every innovation comprises some environmental technology. Germany's future role in these green markets will not only rely on the inventiveness of scientists and engineers but also on the creation of favourable framework conditions. A successful coordination of research funding and regulation policy will enable the German industry to achieve a top position in the lead market of environmental technologies. Representatives from science, industry and politics will present successful instruments of innovation policy which will be followed by a discussion on the impact of framework conditions on innovations and the future interplay of well-proven and new instruments in this field.

Session Moderation

GROTELÜSCHEN, Frank
Technology Writer, Germany

Presentations

German Water Partnership
BECKEREIT, Michael
HAMBURG WASSER
Chairman of the Board of the German Water Partnership (GWP), Germany

Innovation und Normung
BEHRENS, Hermann
DIN Deutsches Institut für Normung e. V., Germany

Nachwuchs für die Umweltbranchen sichern – Beiträge des Ausbildungsstrukturprogramms JOBSTARTER
SARIGÖZ, Fatma
JOBSTARTER, Bundesinstitut für Berufsbildung (BIBB), Germany

Die Sichtweise von KMU
OLDELAND, Martin
Mitglied des Vorstandes von B.A.U.M. e.V., Germany

SESSION RESULTS

Research priority areas for the foreseeable future

- Secondary research of standardisation projects to analyse the role of different stakeholders in the innovation process.
- Development of viable business models for the cooperation of universities and industry which guarantee excellence and profits.
- Incentive mechanisms to accelerate the implementation of green technologies.
- Accurately timed inclusion of society in the innovation process.

Necessary framework conditions to foster sustainable innovation

- Current funding has to be optimised and need for alternative funding has to be identified. Especially, the needs and potentials of SME have to be addressed.
- The financing of universities should foster innovations. Cooperation with industry should become an attractive measure to gain reputation and financial power.
- A vital venture capital scene is required to decouple investments in green technologies from the general economic situation.
- Research projects should include the issue of standardisation ab initio. Networking with stakeholders should accompany the development of standards during the whole innovation process.
- The exchange between universities and SME should be enhanced to improve knowledge and technology transfer.
- The lack of specialised workforce for green technologies could partially be compensated by in-firm training and dual study paths.

Other important issues or topics discussed during the session

- The crucial role of entrepreneurship as an important element of innovation.
- The potential for savings due to green technologies is still systematically underestimated by SME.
- Students with in-firm training could play an important role in bridging the gap between universities and industry.

C – Sustainable Forestry

■ C1 Mobilisation and Supply of Wood

Date: 09/09/2009

Time: 14:30 - 16:00

For Germany, market-oriented and ecologically efficient forestry in close cooperation with a competitive timber industry presents a significant economic factor. Wood production still is the most valuable revenue from forests. Thus optimisation of value chains ranging from timber production to the wood working industry including required logistics and information technologies is of major importance.

Session Moderation

KLEINSCHMIT VON LENGEFELD, Andreas
Forest-based Sector Technology Platform, Brüssel,
Belgium

Presentations

BECKER, Gero
MatchWood, EFORWOOD (6. EU-Forschungsrahmen-
programm), Germany

MERFORTH, Carsten
Rettenmeier Holding AG, Wilburgstetten, Germany

SAUTER, Udo
Starkholz, Woodvalue (ERA-NET Woodwisdom-Net),
Germany

SCHELLER, Michael
HolzCluster Nord, AFORS (KMUinnovativ), Germany

SESSION RESULTS

Research priority areas for the foreseeable future

- Sustainable development of the forest-based sector and the improvement, management optimization and supply of the resource wood.
- In the future where does the resource wood come from and what is the price? Are there going to be local markets for the supply?
- Regions will not be able to cover the demand. What is the development of the international markets?

- Where do we get price information for increasing investments in forest ownership and the processing industry?

Necessary framework conditions to foster sustainable innovation

- Integration of all stakeholders (contractors, consumers, political decision makers)
- Development of new cooperations
- Special features of industrial locations and regions need to be profited from (e.g. Cluster Initiatives), support of existing SME structures since this is the economical backbone of rural areas (i.e. trans-cultural cooperation to meet the everyone's requirements).
- Since years supporting measures of the Länder and the Federation are forcing the forest conversion to increase the ratio of deciduous tree species. This in the future will lead to a different amount of round wood. New measures und instruments are demanded to support the processing of arising assortments.

Other important issues or topics discussed during the session

- In the future forests should be serving as a "forest warehouse".
- Integration of different disciplines and information technologies among the value-added chain (early simulation of forest uses as a decision support system in silviculture)
- Think global – act local: Knowledge on regional, national and international markets is of high importance to operate successfully (all stakeholders).
- Interface optimization very important in optimizing logistics (e.g. harvesting conditions in the long-term will lead to the supply of small wood because of the prevention from damage to the stand)
- Optimization of logistics and internal processes (solutions among the entire logistic chain).

■ C2 Wooden Biomass and Bioenergy

Date: 09/09/2009
Time: 16:30 - 18:00

Shortage of fossil fuels and challenges for their substitution by bioenergy is actually discussed in Germany. Counter-weighting the potential of a possible contribution of forest resources, the use of agricultural land for fast growing trees is in the focus of the discussion of policy makers and the public. Thus the common challenge and chance will be the cultivation and supply of renewable energy resources on a crop basis. Until now the production of wood has been considered to be resource material for wooden products. Under changing conditions and considering the urgent need to provide for energy from renewable resources the production of fast growing tree species on agricultural land has become a highly relevant issue.

Session Moderation

KONNERT, Monika
Herkunftskontrolle – Bayerisches Amt für forstliche Saat- und Pflanzenzucht (ASP), Teisendorf, Germany

Presentations

BEMMANN, Albrecht
Agrowood, Germany

HALLER, Peer
Agrowood, Germany

MURACH, Dieter
Dendrom, Germany

PERTL, Ludwig
Amt für Landwirtschaft und Forsten, Fürstenfeldbruck, Germany

GEBHARDT, Karl
Herkunftskontrolle, Germany

SESSION RESULTS

Research priority areas for the foreseeable future

- Wood is not only demanded by the energy sec-

tor but is also requested by material, mechanical and chemical sectors.

- Dendromass is a highly important future resource for the energy and material use showing many ecological advantages compared to annual bio-energy sources.
- Further development of methods to identify origins of forest seeds (finger prints).
- Species abundance in short rotation coppice is significantly higher than on annual agricultural crops.
- Agroforestry systems are able to revalue landscapes with respect to tourism and recreation.

Necessary framework conditions to foster sustainable innovation

- AGROWOOD thus aimed at showing chances and restraints of short rotation coppice to improve framework conditions.
- Development of agroforestry systems or short rotation coppice highly depends on the legal and political framework conditions. Current non-specified support mechanisms and unclear conditions are the reasons to reject these systems
- Agroforestry systems are currently not declared as agricultural production systems albeit agricultural uses are dominating.
- The Bundeswaldgesetz needs to put into practice a delimitation between agrarian wood production and forestry to create a higher legal security for the agrarian wood sector.
- Clarification regarding the forest lineage and reproduction law. For forestry purposes the law intends to only allow the clone distribution of the category "proofed". Yet there is no agreement whether short rotation coppice or agroforestry systems fulfil the requirement.

Other important issues or topics discussed during the session

- Acceptance of farmers and the broader public regarding the above mentioned systems needs to be fostered. Information and consulting as well as the establishment of sample plots and creation of regional value-added chains might be helpful
- An economic assessment of those systems is difficult as in lieu of an annual rotation the entire period of use needs to be taken into account.

■ C3 Uses and Conflicts in Forest Landscapes

Date: 10/09/2009
Time: 09:00 - 10:30

Sustainable use of resources, utilisation and development of forests and densely wooded landscapes will be in the focus of this session. How can forests and forestry landscapes be managed to improve quality of life and simultaneously sustain the supply of natural, social and economical resources and services from forests?

Comprehensive demands to the sector will require holistic approaches especially in rural areas. Here the management and utilisation of forests as well as the wood processing have a significant relevance for the continuous and consistent regional development. For a sustainable use of resources, thus, the optimisations of forests' services have to consider regional distinctiveness.

Session Moderation

ENDE, Hans-Peter
NEWAL-NET – Leibniz-Zentrum für Agrarlandschaftsforschung (ZALF) e.V., Müncheberg, Germany

Presentations

ELMER, Michael
OakChain, Germany

FÜRST, Christine
ENFORCHANGE, Germany

JENSSEN, Martin
NEWAL - NET Stiftung Schorfheide-Chorin, Germany

KÖHL, Michael
C-Sequestrierung, Germany

SESSION RESULTS

Research priority areas for the foreseeable future

- Minimize risk through conversion of forests to persist future hazards such as climate change. The future-adaptive forest looks for increasing tree species diversity on site.
- Outline models need to be pictographic to better communicate them.
- Visualisation of forest outline models with participation of different interest groups
- Systemic approaches including future sustainable forest ecosystems, sustainable management concepts, wood mobilization, sustainable use of wood through innovative processes and products
- The production and use of wood, wood quality, wood logistics and the cross-sectoral communication show optimization potentials
- C-Sequestration to relieve the atmosphere is not only a result of forest growth but also of storage and substitution effects of long living wood products.
- There are considerable information needs to estimate the success of the above approaches

Other important issues or topics discussed during the session

- Development of innovative indigenous deciduous wood products to decrease the import of wood products made of e.g. tropical wood species.
- Future use of Douglas fir wood
- Development of key scenarios with public involvement

■ C4 Products and Lead Markets

Date: 10/09/2009
Time: 11:00 - 12:30

Future sustainable markets for wood as a renewable resource have been in the focus of various research approaches over the last few years, e.g. the identification and development of potential sustainable solutions for enterprises and associations in the forest-timber chain in the field of timber construction.

Along the forest-wood chain – from tree felling to the point of a processed timber product – the forest-wood sector encounters the challenge of securing and improving their future (sustainability).

Considering climate change tree species such as beech or the implementation of new species will be even more relevant for future forest conversions and market situations. The discussion of results will thus aim at how new qualities of new species will be processed and how new products will be competitive compared to conventional materials such as plastics, aluminium and concrete.

Session Moderation

MARUTZKY, Rainer
Schäl furnierprodukte – Fraunhofer-Institut für Holzfor-
schung WKI, Braunschweig, Germany

Presentations

BERTHOLD, Dirk
Fraunhofer-Institut für Holzfor-
schung WKI, Braun-
schweig, Germany

DIETER, Matthias
Johann Heinrich von Thünen-Institut, Hamburg,
Germany

KRISTOF, Kora
Holzwende 2020plus, Germany

RADEMACHER, Peter
Modifizierte Buchenholzprodukte, Germany

SAUERWEIN, Peter
Verband der Deutschen Holzwerkstoffindustrie e.V.,
Gießen, Germany

SESSION RESULTS

Research priority areas for the foreseeable future

- The long production period of wood ranging from sowing trees to distribute forest products shows that there is a need to scientifically grasp the process of change in forest and society.
- Future markets for wood products of new tree species
- Regarding the adjustment of forest tree species composition the climate forecasts still do not give acceptable security
- New intelligent processing technologies to increase yield and compensate quality lacks in timber assortments
- Improvement of wood properties, especially technical properties resulting in higher duration of indigenous wood species
- Support of value-added thinking and acting
- Support of cross-sectoral networks to moderate knowledge transfer and consulting among entrepreneurs in the forest-wood chain
- Life cycle assessments of specific wood products

Necessary framework conditions to foster sustainable innovation

- The available round wood potential depends on different factors such as the natural initial situation (site, tree species composition and age structure), the political, economical and technical framework conditions and the objectives of forest owners.
- Support of concepts for the material wood use
- Policy, economy and society need to accept the concept of using wood in cascades

Other important issues or topics discussed during the session

- Future wood potentials regarding the aspects of forest conversion
- HighTec and mass assortments of timber

■ C5 Future and International Issues

Date: 10/09/2009

Time: 13:30 - 15:00

From a today's perspective and from the scientific status quo, what are the guiding principles visions and trends in future forestry and for the forest-based industry? What position needs to be taken up to enable today's and future generations to manage uncertainties and risks as well as chances of sustainable forest utilisation and development?

The questions raised go back to the complexity and dynamics of the forest and wood sector, the uncertainties of changing framework conditions, the dynamics of economical, demographical, technological and societal processes. Thus the consideration of future aspects and provision of actionoriented recommendations are essential for a stable ecological, economical and social development. They have to be discussed in different planning intervals, nationally and internationally. Knowledge transfer also is a crucial part of these developments and implementations of research and will be presented here.

Session Moderation

BRÜGGEMANN, Beate
Zukünfte und Visionen Wald 2100 – Institut für internationale Sozialforschung Berlin/Freiburg, Germany

Presentations

SCHRAML, Ulrich
Zukunft und Visionen Wald 2100, Germany

MILITZ, Holger
ERA-NET WoodWisdom-Net, Germany

ANDERS, Kenneth
Wissenstransfer, Germany

KLEINHÜCKELKOTTEN, Silke
Wissenstransfer, Germany

KATZ, Christine
Wissenstransfer, Germany

VON TEUFFEL, Konstantin
FTP GNSG, Freiburg, Germany

SESSION RESULTS

Research priority areas for the foreseeable future

- Concepts of knowledge transfer, cooperation and the discourse for a sustainable development are to be strengthened.
- Communication of innovations in technology as well as organizational and cooperative achievements.
- A dialogue on the future of forests needs to integrate society
- Sensitization of those who apply and implement scientific results and thus being dependent on an adequate knowledge transfer. More specific determining of target groups, integration of transfer strategies in the beginning of project application and evaluation of transfer activities.
- Knowledge transfer cannot be realized without inter- and transdisciplinarity

Necessary framework conditions to foster sustainable innovation

- Technological innovation and social acceptance
- There is agreement among scientists and practitioners in transfer between applied and basic research, the networking between national research programmes and international supporting measures; though complicated and long lasting proposal submitting processes make it quite difficult for SMEs to participate in these processes.
- Transdisciplinarity has to be integrated in the process from the beginning

Other important issues or topics discussed during the session

- What is the design of a dialogue on future and sustainability without focussing only the technical aspects? How can we foster cross-border knowledge transfer and cooperation between researchers and practitioners nationally and internationally?
- Research as a mutual transfer process between research and society

■ C6 Research, Political and Practical Relevance for Sustainable Forestry

Date: 10/09/2009
Time: 15:00 - 15:45

In session C6 of the final conference of the BMBF research programme “sustainable forestry” representatives from policy, industry and research will come together for a final panel discussion. The session will broach the issue of “research, research funding and the involvement of stakeholders from the industry”.

Session Moderation

AMELANG, Dorit
Schriftleiterin Forst & Holz, Hannover, Germany

Presentations

BÜRGER-ARNDT, Renate
Ostalb, Georg-August-Universität Göttingen, Germany

HUTH, Ullrich
Deutscher Holzwirtschaftsrat e.V., Bonn, Germany

LAMMEL, Richard
Bundesministerium für Ernährung, Landwirtschaft und Verbraucherschutz (BMELV), Referat 534, Germany

LESSNER, Carsten
Deutscher Forstwirtschaftsrat e.V., Berlin, Germany

LOSKILL, Renate
Federal Ministry of Education and Research, Germany (BMBF), Germany

SPELLMANN, Hermann
Nordwestdeutsche Forstliche Versuchsanstalt (NW-FVA), Göttingen, Germany

SESSION RESULTS

Research priority areas for the foreseeable future

- Not only transdisciplinarity but disciplinary research should be promoted as there is a need for both and monetary resources need to efficiently finance both.
- Public Relations in the forest and wood sector are to be strengthened
- Further research on innovative wood products to substitute steel and concrete and to foster a broad range of applications of indigenous tree species.
- knowledge on the beech mixed stands once they reach the harvesting age
- Further research on large dimension timber and climate
- Research on the most economical way to integrate nature conservation in forestry

Necessary framework conditions to foster sustainable innovation

- Political support of platforms fostering a central marketing and distribution of wood products
- Further education for wood users and end customers
- Higher credit needs to be given to the forest and wood sector from policy

Other important issues or topics discussed during the session

- 25 joint research projects have shown a transition from sectoral to transdisciplinary research and thus have delivered new ideas and technologies in research for sustainability.

Exhibition



The Price of Water: Valuation of Global Water Resources through Dynamic Optimisation

- **Description:** Water is often undervalued, especially in agriculture.
- **Objective:** We couple a global hydrology model with an agricultural sector optimisation model, in order to derive an implicit value of scarce water resources under future climate.
- **Forecast:** Regional water management can be better targeted with these results.

contact: Dr. Hermann Lotze-Campen,
Potsdam-Institut fuer Klimafolgen-
forschung (PIK)

www.fona.de/society/water



GETIDOS – Getting Things done Sustainably: Theory, Empirical Basis and Potential of Social Entrepreneurship

- **Description:** Water Shortage – Global targets for drinking water and sanitation not met – New actor: Social Entrepreneurs (SE) offers innovative means for human development.
- **Objective / Forecast:** Knowledge base on SE in the water sector – water map – self-evaluation tool – collaborative competition.

contact: Eva Wascher
Social-ecological Research Group
GETIDOS
Ernst-Moritz-Arndt Universität
Greifswald

www.fona.de/society/getidos



RE-Regions: Socio-Ecology of Self-Sufficiency

- **Description:** Analysis of regions, aiming to supply themselves completely on the basis of Renewable Energy with the focus on bioenergy.
- **Objective:** The main goal is to identify success factors and to show their interrelations.
- **Forecast:** Recommendations will be derived and a decision making framework will be developed.

contact: Dr. Chantal Ruppert-Winkel
Centre for Renewable Energy
Albert-Ludwigs-University Freiburg

www.fona.de/society/ee-regions



Fostering Sustainable Consumption by Integrating Users into Sustainability Innovations (NaNu!)

- **Description / Objective:** The aims of NaNu! are to test lead user theory and also to give recommendations on how to integrate users into sustainability innovation processes. To this end, innovation workshops, idea competitions and toolkits are implemented.
- **Forecast:** Lead users contribute to the development and introduction of sustainability innovations.

contact: Prof. Dr. Frank-Martin Belz (project manager), Dr. Marlen Arnold (project coordination)
TUM School of Management

www.fona.de/society/nanu



CLEAN – CO₂ Large-Scale Enhanced Gas Recovery (EGR) in the Altmark Natural Gas Field

- **Description:** Research and development project for CO₂ induced EGR.
- **Objective:** Development of techniques and monitoring tools for EGR and a safe long-term CO₂ storage.
- **Forecast:** Establishment of internationally approved standards for CO₂ induced EGR to reduce CO₂ emissions into the atmosphere.

contact: Dr. Maja Tesmer
Zentrum für CO₂-Speicherung
Helmholtz-Zentrum Potsdam
Deutsches GeoForschungsZentrum GFZ

www.fona.de/earthsystem/clean



The Yangtze-Project – Land Use Change, Soil Erosion and Mass Movements

- **Description:** The Three-Gorges-Dam leads to resettlement and land reclamation for agriculture on steep slopes followed by severe soil erosion and mass movements.
- **Forecast:** The project develops a risk assessment and forecasting system to locate high-risk areas using GIS-based erosion modeling, data mining tools for landslide recognition and remote sensing to assess the landscape's vulnerability and recommend sustainable land management systems.

contact: Prof. Dr. Thomas Scholten
Eberhard Karls University Tübingen

www.fona.de/earthsystem/yangtze

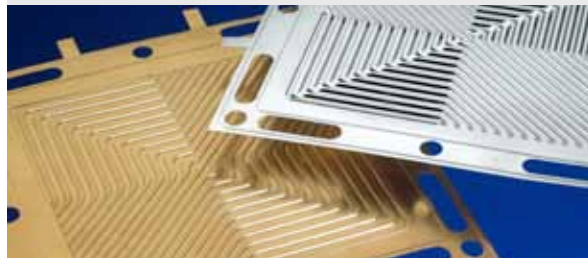


The North Atlantic as Part of the Earth System: From System Comprehension to Analysis of Regional Impacts

- **Description:** The Atlantic Ocean is responsible for the relatively mild climate over Europe and provides transportation but it can also pose a threat to coastal regions.
- **Objective:** Specification of an observational and diagnostics system for long-term recording and prediction of the variability and extreme events.
- **Forecast:** Results include a quantification of water mass formation, freshwater import, and changes in the properties of the Atlantic Water.

contact: Prof. Dr. Detlef Stammer
KlimaCampus Universität Hamburg

www.fona.de/earthsystem/north_atlantic



Selective Functionalisation of Surfaces by Additive Micro Laser Manufacturing (MIFULAS 2)

- **Description:** Development of the micro laser cladding process and the required system technology.
- **Objective:** Reduction of the used gold material for the contacting of electric components, e.g. bipolar plates for fuel cells.
- **Forecast:** Material reduction by factor 100 achieved, comparable electrical properties.

contact: Dipl.-Ing. Torsten Jambor
Fraunhofer Institut für Lasertechnik
Aachen

www.fona.de/resources/mifulas



Increase of Resource Efficiency in the Building Industry

- **Description:** Heterogeneous construction and demolition waste; crushing and grinding; shaping by granulation; stabilising by thermal treatment.
- **Objective:** Lightweight aggregates with adjustable, definite and consistent product properties.
- **Forecast:** Upcycling of construction waste instead of landfilling; use as building material, plant substrate etc.

contact: Prof. Dr.-Ing. habil. Anette Müller
Bauhaus University Weimar

www.fona.de/resources/debris



Resource Efficiency via Strip Casting to Fabricate High Strength Ductility® Steel

- **Description:** Upscaling: lab-Beltcaster to demonstration-Beltcaster for HSD® steel.
- **Objective:** Production of HSD® by saving resources; development of casting process; proof of application potential.
- **Forecast:** Weight saving in automotive industry; new steels produced with Belt Casting Technology.

contact: Dr.-Ing. Rune Schmidt-Jürgensen
Salzgitter Mannesmann Forschung GmbH

www.fona.de/resources/hsd-steel



Innovative Light Weight Construction of High-Strength, Ductile Cast Iron Considering Bionic Calculation Methods

- **Description:** Bionic weight optimization of chassis and motor components for vehicle manufacturing using +GF+ Sibodur cast iron alloy.
- **Objective:** Weight and cost reduction up to 20% and a corresponding reduction of emission and energy expenditure.
- **Forecast:** On chassis component like steering knuckles and wheel carrier we already have achieved the target and could implement projects into serial production.

contact: Axel Rudolph
Head of Quality Management
Georg Fischer Automotive

www.fona.de/resources/sibodur



InnoWert – Innovation Potentials for Value Chain Partnerships and Resource Management in Rural Regions

- **Description / Objective:** The project aims at accelerating the structural changes in the rural area of Ahlen by developing value chain partnerships without wasting any natural or human resources.
- **Forecast:** Emanating from the former coal mine Westphalia, technological innovation will be generated and new knowledge will be locally fixed.

contact: Kirsten Staubach
Prospektiv Gesellschaft für betriebliche
Zukunftsgestaltungen mbH

www.fona.de/resources/innowert



The International Water Research Alliance Saxony – IWAS

- **Description:** Contribution to IWRM in hydrologically sensitive regions; capacity development (CD) with local counterparts.
- **Objective:** CD measures which are necessary for the improvement of the local capacity.
- **Forecast:** It is expected that the measures will have substantial impact on the development and implementation of IWRM.

contact: Dietrich Borchardt
Helmholtz Centre for Environmental
Research – UFZ

www.fona.de/international/iwas



Networking and Supporting Activities for the Research Programme IWRM

- **Description:** Supporting professional exchange between the individual projects of the funded research programme IWRM.
- **Objective:** Presenting the IWRM research programme and its results on the national and European level.
- **Forecast:** Implementing and documenting status seminars and topical workshops within the scope of the research programme.

contact: Christian Stärz
Helmholtz-Centre for Environmental
Research – UFZ

www.fona.de/international/iwrm



GLOWA Jordan River – An Integrated Approach to Sustainable Management of Water Resources under Global Change

- **Description:** Global change severely increases water scarcity in the Jordan River basin, calling for scientifically sound solutions to the crisis.
- **Objective:** A German, Jordanian, Israeli and Palestinian team provides scientific support for sustainable management.
- **Forecast:** Green water management is a key solution to the problem.

contact: Christopher Bonzi
University of Tübingen
Department of Plant Ecology

www.fona.de/international/glowa



Young Cities – Urban Energy Efficiency; Developing Energy Efficient Urban Fabric in the Tehran-Karaj Region

- **Description:** Systemic production of energy efficient urban structures; integration of disciplines on planning & building pilot projects.
- **Objective:** Planning methods for mitigation & adaption of built environment to climate change in arid region housing.
- **Forecast:** Elaboration and evaluation of pilot projects, vocational training etc.

contact: Prof. Dr. Rudolf Schäfer
Institute of Architecture, Technische
Universität Berlin

www.fona.de/international/tehran



Solarvalley Mitteldeutschland – Solar Power for a Sustainable Energy Supply

- **Description / Forecast:** As a winner of the Leading-edge Cluster Contest of the BMBF, and an alliance of enterprises and academia in photovoltaics, Solarvalley's objectives are: Achieving grid parity by 2015, developing an integrated R&D concept, creating an integrated nationwide training program, strengthening Central Germany's leading position in photovoltaics worldwide.

contact: Dr. Peter Frey
Managing Director
Solarvalley Mitteldeutschland e. V.

www.fona.de/energy_climate/solarvalley



BMBF "Energy Efficient Cities Contest": Accompanying Research

- **Description:** Within the "Aktionsplan Dienstleistungen 2020", accompanying research of BMBF's "Energy Efficient Cities Contest" supports 17 cities in innovation with services, energy modeling and innovation management in the "system city".
- **Forecast:** Cities are funded through BMBF's Basic Energy Research 2020+. Concepting linkservices with energy efficiency and climate protection.

contact: Michael Knoll
Institute for Futures, Studies and
Technology Assessment

www.fona.de/energy_climate/city

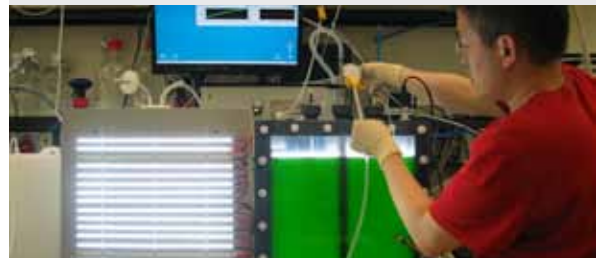


Hyderabad as a Megacity of Tomorrow: Climate and Energy in a Complex Transition Process towards Sustainability

- **Description:** The Indian Megacity of Hyderabad will have a population of approx. 10.5 M. by 2015.
- **Objective:** The aim of the project is to compile mitigation and adaptation strategies and to realise a climate friendly and energy efficient growth path by changing institutions and governance structures.
- **Forecast:** Thereto a consortium of German and Indian Partners has been formed. Project Chair: Division of Resource Economics, Humboldt University of Berlin.

contact: Prof. Dr. Dr. h. c. Konrad Hagedorn
Humboldt University of Berlin

www.fona.de/energy_climate/hyderabad



Design of Natural Systems for Light-Powered H₂-Production: From Molecular to Mass Fermentation Systems

- **Description:** To produce hydrogen (H₂) from water and sunlight, we engineer a biological design cell based on a cyanobacterial organism.
- **Objective:** The cell combines water-splitting photosynthesis with an imported H₂-producing module.
- **Forecast:** In specially designed photobioreactors, this system should produce 100-fold more bio-H₂ than presently existing natural systems.

contact: Prof. Dr. Matthias Rögner
Ruhr-Universität Bochum
Fakultät für Biologie

www.fona.de/energy_climate/h2-cells

Fona – The BMBF Framework Programme “Research for Sustainability”

Every generation must solve its problems and must not burden future generations with them. However, sustainability also means that the living conditions on the Earth and the ability of humankind to act and react are safeguarded on a long-term basis.

The guiding principle of sustainability is directed at all social actors from the political arena to companies, the scientific community and educational institutions all the way to private households. All of them are called upon to point out possible solutions for sustainability.

The sustainability debate has been international in nature right from the beginning and inevitably requires a global view and internationally based activities and problem-solving concepts. Education

For five years, BMBF has been funding innovative activities and projects in four thematic areas (Economy, Regions, Resources, Society) and thus bundles applied research in these areas.

Fona, therefore, contributes to the goals of the national sustainability strategy. The goals of this strategy – for example in resource or energy efficiency or in the use of land – can only be achieved through innovations. Typical features of Fona are the creation of networks of science, education, economy and society and the focus on inter- and transdisciplinary research.

The annual conferences of Fona and the website www.fona.de serve the purpose of networking and have been established over the years as central fora



and research are central elements of international cooperation since they play a major role in building up problem-solving and action-taking competence. Fona is the framework programme “Research for Sustainability” of the Federal Ministry for Education and Research (BMBF).

for stakeholders from politics, science, economy and society where current issues of research for sustainability are discussed, developed and driven forward.

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