

EUROPÄISCHE AKADEMIE

zur Erforschung von Folgen wissenschaftlich-technischer Entwicklungen
Bad Neuenahr-Ahrweiler GmbH

Direktor: Professor Dr. Dr.h.c. Carl Friedrich Gethmann

NEWSLETTER

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EDITORIAL

■ This is the 75th issue of the Newsletter of the Europäische Akademie. The first volumes of the Newsletter – No 1 was published in September 1996 – were written in German. Since issue No 16 (August 1999) the language of the Newsletter has been predominantly English. Currently, it informs 2,600 readers worldwide. While during the first years the Newsletter was published about five times per year, it has been appearing about eight to ten times per year since 2003.

The Newsletter informs regularly about the development of the academy and about current events such as conferences and project group activities. Furthermore, it portraits scientists who are working with the Europäische Akademie and provides information about lectures and publications of the scientific staff.

Authors and topics of the leading article “Focus” of the first issues were:

- Armin Grunwald: *Sozialverträgliche Technikgestaltung?* (9/96),
- Carl Friedrich Gethmann: *Auf dem Wege zur Weltkultur? Universalismus und globales Spiel* (12/96),
- Otfried Höffe: *Moral als Preis der Moderne. Zur Ethik der wissenschaftlich-technischen Zivilisation* (5/97).

Further authors of the “Focus” were, among others, Friedrich Breyer, Jürgen Mittelstraß, Julian Nida-Rümelin and Alain Pompidou.

In 2006 there was a relaunch of the corporate design of the academy and, thus, the Newsletter was redesigned as well (starting with issue No 62, May 2006). It now appears with lighter forms of script and more white spaces, combining subdued colours with modern design.

KM/FW

Further information: www.ea-aw.de

FOCUS

Towards a properly greened Gross Domestic Product

Bert Droste-Franke

Macroeconomic aggregates like the Gross Domestic Product (GDP) are known still to show shortcomings in reflecting economic activities properly, not to mention effects caused to the environment or overall welfare. Since the 1950s and 1960s regularly criticism has arisen concerning the design of national accounts which resulted in their continuous further development. However, the GDP is still one of the most popular indices taken to communicate the economic development prominently in public media and is often misinterpreted as welfare indicator. In parallel, during activities on national and international level focussing on the assessment of environmental damage costs, a very good basis for corrections of the GDP reflecting environmental impacts has been developed. This paper introduces several concepts and discusses specific aspects which have to be considered for a respective adequate correction of the GDP.

Environmental effects of economic activities

■ Together with the increasing intensity of economic activities in the last decades, a growing number of environmental effects has been observed which could be attributed to them. Some of the most serious ones are impacts due to the release of chemical substances to atmosphere, soil, and water. Among others, these were connected to smog, photo-chemical smog, ozone layer depletion, contaminated land, acid rain, extreme fish mortality, food pollution, and respiratory diseases. Alone the fact that this list reads like a list of catchwords of current and past headlines shows how severe the effects are.

Several research projects have tried to analyse environmental damage costs. Particularly as a result of the project series “Externalities of Energy (ExternE)” funded by the European Commission which started in 1991 and are still ongoing, meanwhile a number of impacts from environmental pollution can be estimated in monetary terms. The developed bottom-up methodology, the so-called “Impact Pathway Approach”, starting from pollutant releases, including models for environmental dispersion and conversion of chemicals, concentration effect models, and specific costs for assessing finally monetary damage costs, has yet widely been applied for numerous policy decisions. Originally dealing with impacts due to stationary energy conversion, the subjects of analysis were extended to the transport sector and to all economic activities. The effects the whole impact pathway currently can be calculated for include human health effects, crop yield losses and increase in frequencies of maintenance

activities for material surfaces. The methodology still has to be further improved and extended. Estimates for air pollution related impacts show that environmental damages due to these ones alone can range up to some per cent of the GDP.

Gross Domestic Product and environmental damages

■ Macroeconomic aggregates like the Gross Domestic Product are derived from national accounting systems accumulating values of traded goods and services for a certain period. Thus, GDP and derived indices are designed to represent measures for economic production activity. As such they do, of course, not include non-monetary welfare and, thus, cannot serve as a welfare measure. Actually, they even have some shortcomings in their role as production measures. One example is that unpaid products and services are not considered. Furthermore, social costs arising from environmental impacts caused by production processes are not covered or not considered appropriately which leads to an overestimation of the net production value.

However, GDP and NDP (Net Domestic Product) are regularly reported and take a central role for measuring the economic development, and sometimes they are even misinterpreted as indicators for overall welfare as mentioned above. This, as well as the high social costs of environmental impacts, shows the importance of considering current and future social costs as far as possible to get a more appropriate measure for net productivity and, thus, a better guidance for a long-term economic development.

Various concepts for corrections exist

■ Numerous concepts have been developed to improve national accounting and to derive further indices, driven by the aims either to improve the production measures or to get indicators for overall welfare or sustainable development. Accordingly, there is a great difference between the approaches. One concept is to add values to environmental aspects in physical units which then are reported as supplements in form of so-called satellite accounts. Such additional accounts do not have an influence on the macroeconomic aggregates, but could build the basis for their modification. An example for an index which seeks to indicate welfare over time, considering sustainability aspects, is the "Index of Sustainable Economic Welfare" (ISEW). It is based on the private consumption weighted by an index on income distribution and adds activities not adequately considered, corrects for long-live products, considers welfare losses, and includes further corrections concerning capital balances. One example for an index which tries to correct macroeconomic aggregates in order to measure sustainable development is the "Sustainable National Income" (SNI). It is derived by diminishing the NDP by the minimum costs for accomplishing a set of standards.

Recommendations of the United Nations concerning the modification of aggregates in national accounts laid down in their concept for integrated environmental and economic accounting (SEEA) propose two ways of correction, a welfare-based correction and a correction aiming to obtain a measure indicating sustainability. As regards the first option, it is simply recommended to diminish aggregates by damage adjustments concerning the valuation of assets not yet included, by natural resource depletion, and by pollution damage to human health. In connection with the second option, it is recommended to apply economic equilibrium modelling in order to derive macroeconomic aggregates for time paths which hypothetically lead to compliance with predefined environmental standards. The German Statistische Bundesamt (Statistical Office), responsible for national accounting in Germany, currently follows the concept to provide additional environmental data in form of satellite accounts which can be used for economic modelling by research institutes. It has not yet been planned to report respective corrected aggregates.

What is the task: monitoring or strategy analysis?

■ The concepts mentioned above reveal that a decision about the tasks to be fulfilled by indicators is vital to construct appropriate indices. Intentions of indices could be to report on welfare relevant issues over time which could include sustainability aspects or to analyse strategies to achieve given targets in the future. To give a complete picture, in both cases full costs have to be taken into account which means that the damage costs as well as investments in environmental measures have to be considered. Thus, besides damages, in a damage-adjusted aggregate of a welfare indicator also environment-related investment costs have to be included correctly. Furthermore, a consideration of environmental damage costs for modelling a green economy does not only ensure that the strategy derived to meet the targets is efficient with respect to private costs but also with respect to social costs, as far as these can be assessed. Additionally, it will be possible to derive strategies efficient with respect to all costs for areas in which no targets have been set. Such a strategy could then be used to discuss disaggregated policy targets in physical units (e.g. limit values for concentration of harmful substances in air) which could facilitate the

implementation of the efficient strategy. Moreover, in those areas for which social costs can be assessed and targets have already been set, it will be possible to reappraise the targets.

In order to analyse details and cover also impacts which cannot be expressed adequately in monetary terms, aggregates should be supplemented by physical indicators. These are particularly important if information about environmental processes which could lead to unacceptable effects is characterised by high uncertainties or little scientific knowledge and action is urgently required. Unacceptable effects can occur if essential life-supporting functions of the environment are endangered or if the damages can only be repaired with an enormous, unacceptable effort and thus, are 'quasi-irreversible'. Examples for such effects are potential damages to ecological systems, e.g. caused by environmental pollution or climate change. In order to monitor environmental change in these areas, indicators in physical units together with respective limit values, indicating maximum exposure which is known not to lead to unacceptable effects, are preferable, particularly because of their precision in revealing compliance with critical exposure.

Application-oriented assessment of damage costs is necessary

■ In most cases, the assessment of the damage costs due to environmental pollution can only be carried out properly if the application background is already known. Regarding the calculation it is distinguished between the originator and the place and time where and when the damages are physically caused and the effects and utility losses are observed respectively. One example may help to illustrate the issues: by emitting heavy metals to the air in Germany a polluter causes damage costs in Germany as well as in neighbouring countries. Furthermore, heavy metals are persistent and may still reach human beings via the food chain several hundred years after their release. Additionally, latency has to be taken into account and losses in utility are observed even after human health effects occur.

On the one hand, from a monitoring perspective, it could be interesting which impacts or utility losses are caused or observed in the country concerned during a certain period. On the other hand, with the purpose to act against the impacts, it could also be interesting to attribute the impacts and damage costs to the originators. From the perspective of strategy analysis, it is important to know which polluter causes any damage costs and where these occur. Options for calculation are e.g.:

- Damages caused in the period, in the country;
- damages occurring in the period, in the country and
- all present and future damages caused by the country's economic activity and related emissions, occurring inside and outside the country.

Respectively, a) can be used to show effects of national measures onto the national environmental status quo, b) can be used to compare with national health statistics, and c) can be applied to find the (international and intertemporal) optimal implementation strategy of national mitigation measures concerning environmental pollution.

Consistency with national accounts is required

■ The task of providing applicable damage cost estimates becomes even more complex if the values are to be used for the correction of macroeconomic aggregates. Again, the message and the calculation instruction for the final indicator have to be clarified before the appropriate values can be estimated. Computable production losses due to losses in field

crops may have to be treated differently than increases in the maintenance costs for building facades. Accordingly, damage costs due to human health effects may need to be subdivided into productivity losses as a result of illness and premature death, costs of health treatment, and the reduction in well-being of the persons concerned, e.g. by utility losses resulting from suffer and pain. In order to implement corrections adequately, it is substantial to know additionally to which extent the components are already considered in the aggregates in focus. Moreover, if the valuation is based on surveys, the well-being component covers the consumer surplus, while other parts of the costs derived from market values do not. The consumer surplus is the additional utility a consumer gains if he or she buys a product at a lower price than he or she would have paid for it.

Conclusions

■ Methodologies for the estimation of damage costs arising from environmental impacts caused by economic activities have been developed and improved over the years. Recently, a methodology recommendation in form of a convention has been elaborated by the German Umweltbundesamt (Federal Office for the Environment). Furthermore, much experience was made and numerous recommendations exist concerning the correction of macroeconomic aggregates. Overall, this would represent a valuable starting point to elaborate respective binding concepts for official reporting in Germany. Of course, methodologies still might change and may be extended with a significant impact on the results. Therefore, a regular review and update of methodologies and results should be allowed for in such a concept and the indices should be held flexible and be open for further improvements. Such a concern will also require a practical solution by which a regular assessment of corrected aggregates is ensured so that these can be reported in parallel to the GDP and other economic indices.

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Dr.-Ing. Bert Droste-Franke, Dipl.-Phys., is coordinator of the project group "Fuel Cells and Virtual Power Plants as Elements for a Sustainable Development. Innovation Barriers and Implementation Strategies" at the Europäische Akademie. For his doctoral thesis he worked on the quantification of environmental damages as contribution to environmental accounting. Contact: bert.droste-franke(at)ea-aw.de

WORKING GROUPS

■ Project Group "Responsibility for Future Generations. Implementation of Sustainability in Schooling": 10.9. in Bad Neuenahr-Ahrweiler

■ Project Group "Fuel Cells and Virtual Power Plants as Elements for a Sustainable Development Innovation Barriers and Implementation Strategies": 20.9. in Bad Neuenahr-Ahrweiler

■ Project Group "Pharming. Genetically Modified Plants and Animals as Future Production Site of Pharmaceuticals?": 20./21.9. and 21./22.9. in Berlin

■ Project Group "Societal Implications of Electrical Power Grids": 27./28.9. in Düsseldorf

■ Project Group "The Research Guiding Function of Metaphors from the Information Sciences and their Relevance to the Transformation of the Philosophy of Man": 27.9. in Marburg

Sustainability in Schooling

■ The project group came together in Bad Neuenahr-Ahrweiler to discuss the two core-concepts of sustainability: their differences, their interrelation, and what they demand from an adequate education for sustainable development.

On the one hand side there is the requirement for pure rationality to balance one's (and the collective's) now-for-now-preferences with one's (and the collective's) now-for-then-preferences. On the other hand there is the stronger concept that implies some kind of trans-generational justice. Both concepts are independent of each other which means that they sometimes complement each other, sometimes lie across with each other. Therefore, education for sustainable development does not only have to enable the learner to meet the requirement of both principles but to cope with tensions between them as well.

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Fuel Cells

■ At the 7th meeting of the project group "Fuel Cells and Virtual Power Plants as Elements for a Sustainable Development. Innovation Barriers and Implementation Strategies" further inputs in the areas of technology evaluation with respect to sustainability, innovation determinants and market imperfection, legal aspects as well as innovation barriers and strategies were discussed. Additionally, the preparation of the mid-term meeting, planned for 8th November, was continued by the project team.

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Pharming

■ The draft of the book manuscript of the project group was discussed with external experts at the mid-term meeting in Berlin (20./21.9.). First, Professor Bruce Whitelaw from the Roslin Institute in Edinburgh presented his view on the technology of pharming animals, and Dr. Stefan Schillberg from the Fraunhofer Institut in Aachen spoke about pharming plants technology. The third chapter, on environmental risks, was commented on by Priv.-Doz. Dr. Broder Breckling (Universität Bremen). The first day was concluded with criticism on aspects relating to animal welfare and ethics, provided by Professor Dr. Jörg Luy (Freie Universität Berlin). On the next day, the group first heard Professor Peter Sandoe from Københavns Universitet on ethics. Thereafter, Dr. Elmar Schmitt from Merck KGaA (Darmstadt) offered a practical perspective on drug regulatory affairs. Professor Dr. Gerd Winter (Universität Bremen) provided feedback on the chapter about legal aspects in pharming. A written commentary on legal matters specific to animal protection law was provided by Professor Dr. Müller-Terpitz (Universität Passau). Professor Gary Walsh from Limerick University who was present for the symposium that took place just after the meeting (see below) discussed the book's introduction and technical chapters with the authors.

The reviewers had gone to great length in reading the manuscript and sharing their thoughts, in many cases not just on one chapter but also on other parts of the book and on its general outlook. Very constructive interdisciplinary discussions ensued among the project group and the reviewers, and this will

certainly be reflected in the final version of the book. The first conclusion from this mid-term meeting made sense to all: the working-sub-title of the project ("Genetically modified plants and animals as future production site of pharmaceuticals?") will change, because pharming has now become a reality, with some products approved for medicinal use and more in the pipeline. Recommendations regarding the conditions for pharming and its societal, legal and ethical implications are thus highly relevant. The external experts' comments will help to substantially improve the study which is currently being finalised and can be expected to be published next year.

See also 21./22.9. the article on the symposium "New Applications of Genetic Engineering in Livestock" below.

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CONFERENCES

Symposium "New Applications of Genetic Engineering in Livestock"

■ Which opportunities arise from genetically engineering farm animals, what progress is made in this technology, and which concerns should be addressed? Together with the Berlin-Brandenburgische Akademie der Wissenschaften (BBAW), the Europäische Akademie had invited an interdisciplinary audience and panel of speakers to discuss these questions at the BBAW in Berlin on 21st and 22nd September.

Professor Angelika Schnieke (Technische Universität München), who is also a member of the project group "Pharming", told the audience about the long and difficult path to the first approval of a biopharmaceutical produced in transgenic livestock. In the late 1990ies, the expectation had been for this process to take only four to five years. However, intellectual property problems and other difficulties hampered the progress. Now, 20 years later, the breakthrough has been achieved with a human blood clotting factor produced in transgenic goats. This may just be the start: Professor Gary Walsh (University of Limerick, Ireland) spoke about the growing market for biopharmaceuticals, and how transgenic animals may play a role in delivering to it. Will transgenic animals also have a breakthrough in food production? Professor Heiner Niemann (FAL Mariensee) thought so and expressed his view that in 20 years, genetic engineering will probably be one method among others for breeding desired traits in farm animals. He introduced the audience to the many potentials of transgenic farm animals: besides medical applications as bioreactors, medical models and organ donors, transgenic farm animals are also envisaged to provide healthier food products, healthier production animals, and a better environment. Some genetically engineered lines are already waiting for market approval: transgenic salmon that grow quickly, cows that are resistant to udder inflammation, and pigs that have reduced phosphate content in their faeces.

Professor Louis-Marie Houdebine (INRA, Jouy-en-Josas, France) explained to the audience the biotechnological challenges and possible solutions at the forefront of research. Refinement of these methods is important not only for effective production of transgenic "founder animals" (this is how the first transgenic generation is called) but also for elimination of

side-effects on animal welfare. However, as the audience learned from Professor Adroaldo Zanella (Norges Veterinærhøgskole, Norway), little is at present known about the potential effects of genetic engineering on animal welfare. He explained that how animals can cope with challenges depends partly on the expression of specific proteins in their brains, and genetic changes could influence these mechanisms. Dr. Kees van Reenen (ID Lelystad, The Netherlands) explained a biotechnology-integrated approach to investigating effects of transgenesis on animal welfare by testing the appropriate generations of a transgenic line bred from the founder animals.

Professor Matthias Kaiser (The National Committee for Research Ethics in Science and Technology in Norway) suggested that in order to justify taking risks with a technology, it is not sufficient to identify a benefit. He called for an integrated ethical assessment where risks and benefits are seen in their societal perspective (e.g. who benefits?, who takes on responsibility?). Kaiser argued for a transparent democratic ethical debate where scientists take the initiative to also explain the scientific insecurities regarding the consequences of the technology. He stressed that given the plurality of values and complex risks, the precautionary principle needs to be observed and each product should be evaluated case-by-case. In the near future, he thought that only "pharming" would hold the promise of sufficient benefits to counter objections to the use of transgenic farm animals.

Contributions to the symposium will be published in 2008.

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ESF/ESA/ESPI Conference "Humans in Outer Space – Interdisciplinary Odysseys"

Space-faring nations are heading again for human exploration of the Moon and, eventually, of Mars. Corresponding plans and perspectives gave reason for the a.m. conference which took place in Vienna from 11th to 12th October. The conference was jointly organised by the European Science Foundation, the European Space Agency, and the European Space Policy Institute; it aimed at a comprehensive trans-disciplinary dialogue on manned space exploration beyond technological questions. Dr. Stephan Lingner was invited to present views from the humanities on the cultural dimension of human space exploration.

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NEWS

Art Exhibition

The next opening of an Europäische Akademie art exhibiton will take place on 15th November at the Europäische Akademie, Wilhelmstr. 56, in 53474 Bad Neuenahr-Ahrweiler. The artist, Beate Leisten, will present her latest works. Leisten is a regional artist and this is her second exhibition at the academy. The exhibition, which is supported by the sponsors' club (Verein der Förderer), can then be visited during the opening hours of the academy.

Further information: www.ea-aw.de

PUBLICATIONS

Carl Friedrich Gethmann

“Ethische Aspekte zukünftiger globaler Stromerzeugung”, *Kraftwerke 2007* (19.–21. September 2007), Salzburg 2007, p.1–3

Kristin Hagen

“Animal welfare aspects of creating transgenic farm animals”, in: W. Zollitsch, C. Winkler, S. Waiblinger, A. Haslberger (eds.), *Sustainable food production and ethics*, Wageningen 2007

Karsten Mause

Konsumentenschutz im Hochschulbereich. Unvollständige Nachfragerinformation, Marktversagen & markt-basierte Schutzmechanismen, Berlin, 2007

LECTURES

Carl Friedrich Gethmann

20.9.07

“Ethische Aspekte zukünftiger globaler Stromerzeugung”, VGB-Kongress Kraftwerke 2007 (plenary lecture)

29.9.07

“Wittgensteins angeblicher Sprachspielrelativismus und das Problem trans-kontextueller Geltungsansprüche: Wittgenstein: Philosophie und Wissenschaften”, Forum für Philosophie der Deutschen Gesellschaft für Philosophie, Leipzig

Kristin Hagen

15.9.07

“Animal welfare aspects of creating transgenic farm animals”, 7th Congress of the European Society for Agricultural and Food Ethics, Wien

Stephan Lingner

12.10.07

“Human spaceflight as a matter of culture and national vision”, ESF/ESA/ESPI Conference Humans in Outer Space – Interdisciplinary Odysseys, Vienna

Karsten Mause

13.9.07

“To License or to Certify Higher Education Institutions? That is (Still) the Question”, 24th Annual Conference of the European Association of Law and Economics at Copenhagen Business School, Denmark

15.9.07

Comment on Stefano Clo “Assessing the European Emissions Trading Scheme’s Effectiveness: Have CO₂ Tradable Permits Been Over-Allocated?”, 24th Annual Conference of the European Association of Law and Economics at Copenhagen Business School, Denmark

Katja Stoppenbrink

24.7.07

“Gehört mein Körper mir? – Rechtsdogmatische und -philosophische Überlegungen zu Geltungsgründen und Grenzen des rechtlichen Kommerzialisierungsverbots menschlicher Körper(teile)”, Summer School “Der menschliche Körper zwischen Vermarktung und Unverfügbarkeit. Ethische, rechtliche und soziale Aspekte der Kommerzialisierung des menschlichen Körpers und seiner Teile”, 20.–27.7.07, Interfakultäres Zentrum für Ethik in den Wissenschaften (IZEW), Eberhard-Karls-Universität Tübingen

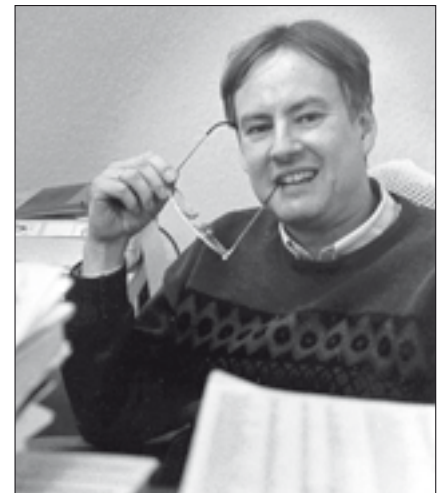
30.7.07

“Enhancement without any effort? – Justifying shortcuts to self-creation”, 2nd Annual Postgraduate Conference in Bioethics: “Why Bioethics? Our research in context”, 30./31.7.07, King’s College in Cambridge, UK

18.9.07

“Brain Computer Interfaces (BCI) – Gedankenexperimente oder Gefährdung der ‘Natur des Menschen?’”, Summer School “Die Technisierung des Gehirns. Ethische Aspekte aktueller Neurotechnologien”, 16.–23.9.07, research group of the Federal Ministry of Science and Education “Zur Relevanz der »Natur des Menschen« als Orientierungsnorm für Anwendungsfragen der biomedizinischen Ethik”, Institut für Ethik und Geschichte der Medizin, Albert-Ludwigs-Universität Freiburg

PERSONALITIES



THOMAS ZIESEMER, born in Kiel in 1953, is associate professor of economics at the University of Maastricht. He studied Economics at the universities of Kiel and Regensburg where he graduated in 1978, worked from 1982 to 1989, and obtained his Ph.D. in 1985. At the University of Maastricht he was assistant professor of international economics from 1989 to 1994 and associate professor of microeconomics from 1994 to 1996. He obtained his habilitation at the Freie Universität Berlin in 1996.

He worked as head of the Macroeconomics Division at the Research Institute MERIT from 2001 to 2006 and coordinated the research programme “The Role of Technology in Growth and Development” at UNU-MERIT from 2006 to 2007.

He is fellow of the Research School METEOR and member of the board of the Netherlands Network in Economics. His fields of interest are: Development, International and Environmental Economics, Growth, and Technical Change. Information on his publications are available from the data bank ‘ideas’ and on his website at UNU-MERIT: <http://www.eaep.infonomics.nl>

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At the Europäische Akademie GmbH Professor Dr. rer. pol. Thomas Ziesemer participated in the project “Sustainable Development and Innovation in the Energy Sector” from 2000 to 2002. Currently he is member of the project group “Fuel Cells and Virtual Power Plants as Elements for a Sustainable Development. Innovation Barriers and Implementation Strategies”.

On 22nd November, 7.30 pm, Professor Dr. Thomas Ziesemer will dispute with Professor Dr. Klaus Heilmuth (Physikalisches Institut, Universität Bonn) on the topic “Renaissance of nuclear power?” at this year’s Abtalt Talk. The sponsors’ club of the Europäische Akademie invites to the event at the Klosterruine Marienthal, Klosterstraße 3–5, 53507 Marienthal. Further information: www.ea-aw.de