



# EUROPÄISCHE AKADEMIE

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

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

## NEWSLETTER

AKADEMIE - BRIEF • NO. 67

NOVEMBER 2006

### EDITORIAL

■ From its early beginnings on, technology assessment (TA) has developed a multitude of concepts reflecting different concerns upon its topics as well as on appropriate methodologies. The plurality of conceptions has challenged especially the German debate upon the “right way” to assess to a high degree. Still ongoing suspicions of TA in terms of representing “technology arrestment”, “acceptance rising” or being “meaningless” reflect the respective confusions of the addressees. In fact, the conceptual diversity of TA has to be seen as its strength, not as its weakness. It is just this diversity which enables TA to evaluate technological developments in heterogeneous contexts. For example: any restriction of TA to non-ethical approaches would suffer from severe shortcomings, if sustainable use of natural resources was to be evaluated. Recall that sustainability is neither a value in itself nor simply a case of bargaining of the present. Its normative foundations and aims towards the future have to be explored carefully by ethical reasoning in order to avoid the results to become arbitrary or myopic. Applied ethics is therefore a “must” for TA, if long-term problems have to be dealt with. This approach precisely corresponds to the academy’s aims towards acceptable solutions for technology advance. The aims and conceptual ideas of contemporary TA as well as the methodological foundations of the academy’s approach were laid down in volume 1 [*Ethik der Technikgestaltung. Praktische Relevanz und Legitimation*. A. Grunwald, S. Saupe (eds.), Berlin 1999] and volume 2 [*Rationale Technikfolgenbeurteilung. Konzeption und methodische Grundlagen*. A. Grunwald (ed.), Berlin 1998] of the Springer series “Wissenschaftsethik und Technikfolgenabschätzung” (ed. C. F. Gethmann). SL/BDF

### FOCUS

#### Natural Fibres and their Possible Applications in Novel Materials

##### A Consideration with a View to Sustainability

Jörg Müssig

**The application of materials on the basis of renewable resources becomes particularly interesting by the worldwide turnaround in the use of raw materials. In terms of technical requirements natural fibres are excellently suited for the reinforcement of polymers. This approach is also of growing interest due to increasing crude oil prices. From our current perspective the use of natural fibres in composites is in line with the three essential pillars of sustainability for the future – economy, ecology and society. To ensure that this will also be the case in the future, the worldwide raw material turnaround and its effects on the selection of materials must be considered critically on the basis of sustainability criteria.**

■ The handling of raw materials is a central element of every sustainability policy. In this context Grunwald (2006) names the following rules of sustainability for the way raw materials are used:

- A sufficient level of non-renewable resources must be maintained over time.
- The consumption rate of renewables must not surpass their rate of regeneration and must not endanger the functional capacity of their respective ecosystems.
- The release of substances must not surpass the absorption capacity of the environmental media and ecosystems.

The main goal in the sustainable use of raw materials and other materials is to ensure their long-term availability and control of the consequences.

The use of renewables in the manufacturing of a product does not always justify the designation “sustainable product”, since more important factors than the conservation of non-regenerative resources must be considered. As stated by Bennauer and Dyckhoff (1995), a comprehensive view considers both the usefulness and disadvantages of a product over its entire life-cycle. In assessing the environmental

sustainability of products made of natural plant fibres the importance of their agricultural pre-stages phase must not be neglected. If environmental aspects are disregarded, a natural fibre gained in a monoculture can cause a higher level of environmental damage than an industrially created fibre.

Responsible selection of materials is becoming increasingly important. This approach is also expressed in the “Augsburg Material Declaration”. As regards to the sustainable design of products, the availability, the process chain, the production, the use and the consumption of materials must comply with the three essential pillars of future viability – economy, ecology and society (Anonymus, 2002 & 2003).

Regarding sustainability, the use of natural fibres should fulfil economic criteria, ecological and social requirements. When new material ideas are introduced, often both economic viability and environmental sustainability have already been assessed; social requirements are usually not considered. The latter should be taken into account against the background of global economic systems. First approaches in the assessment of products, with a view to their social aspects, were recently started by Stiftung Wa-

rentest (German product testing institution). For example, project-specific criteria for the inspection of socio-ecological corporate responsibility were developed for outdoor-jackets (Stiftung Warentest, 2004). These ideas should be incorporated in the early stages of development and assessment of innovative and novel materials. According to Grunwald (1999), innovative surges can result from the interplay of availability of raw materials with clearly improved characteristics and the presence of corresponding manufacturing techniques. In this way, by means of new techniques and methods, and due to changing framework conditions, known materials can be developed into innovative overall solutions. This statement also describes the history of the use of natural fibres in technical applications. Due to new manufacturing techniques and different framework conditions, natural fibres have been re-established in the German automotive sector since the 1990s. Manmade composites made of renewable resources have been used since the beginning of human history. In Egypt coffins for mummies were manufactured from pieces of parchment that were glued together. About 500 B.C., clay pots were produced in the Inka and Maya cultures that were reinforced with plant fibres (Ermanni, 2004). Even though the development of "modern" fibre composites only began with the beginning of industrial manufacturing of petrochemical polymers at the start of the 20th century, there are successful examples of the use of natural raw materials in composites that go back to the year 1850 (Hughes, 2004). From 1850 to about 1870 little boxes for photographs were produced with shellac-resin and sawdust (Stubbs, 2001). At the same time, Francois Charles Lepage patented a composite made of wood flour and blood (from Parisian slaughterhouses) in 1856 in France. The mixture was compressed, and made into desktop items such as inkpots and decorative badges by the Société du Bois Durci (PHS, 2005). In India first trials concerning the use of jute-fibre-reinforced shellac were already carried out in 1926 (Pal, 1985). In the 1920s and 1930s the first natural-fibre composites were manufactured in aircraft construction with the aim of creating lighter parts for primary structures (McMullen, 1984). The work of Norman de Bruyne on propeller structures led to the development of the flax-fibre/phenolic resin-composite "Gordon Aerolite". In the early 1940s this material was used for the steering gear of the training airplane "Miles Magister" of the Royal-Air-Force (SAA, 2003). Beside the aspects of lightweight construction, the aluminium shortage in Great Britain was the reason for this new material concept. Early applications of composites based on renewable resources were not limited to structural parts in aircraft construction; in the late 1930s Henry Ford promoted their application in the automotive sector. As reported by Eisele (1994), natural fibres in fibrous components of automobile

parts were established until well into the 1970s. In the course of the 1970s and 1980s the natural fibres in interiors of automobiles were replaced by petrochemical products. Natural-fibre-reinforced plastic components (such as door trim panels, seat shells, rear parcel shelves) have been regaining importance in the automotive industry in the last few years. At a price of about 0.60 € per kilogramme, natural fibres are an obvious solution for the reinforcement of plastics for economic reasons as well (Karus et al., 2003). From 1996 to 2004 the growth-rate was over 10% per year. In the year 2004 a total of about 80,000 tons of natural-fibre-reinforced plastics (NFP) were used in German automotive construction (leaf-, bast fibres and wood – without recycled cotton fibres). An additional dynamic element in the market is expected with the rising prices for crude oil and energy and the ensuing increase in plastic and glass-fibre prices. This will clearly improve the demand for, and the competitive position of, natural-fibre reinforced polymers. Natural-fibre composites are also becoming increasingly interesting for consumer goods and the construction sector. For instance, the ban on wood preservatives containing CCA (copper, chromium, arsenic) in North America since the end of the 1990s has led to a boom in the use of wood-plastic composites (WPC) as a substitute for all-wood patio-floorboards. By now about 700,000 tons per year of such products are produced in North America, the wood proportion of which is up to 80 per cent mass. The wood materials are used a by-product of sawmills. Unobjectionable polyofines are used for the polymer materials. As already explained at the beginning, new material developments must also fulfil ecological requirements in terms of sustainability. With a view to ecological aspects the use of locally produced natural fibres leads to positive results throughout, as shown for instance in the work of Wötzel et al. (1999). In a comparative life-cycle analysis they examined a material for interior or door trim panels made of hemp-fibre-reinforced-epoxy-resin as opposed to one made of a petrochemical polymer (ABS). In the accumulated energy input study of component manufacturing, the clear advantages of the combination with hemp-fibres and epoxy-resin (73 Mega-Joule (MJ) energy input per component) became apparent against the ABS version (131 MJ energy input per component). The greatest ecological improvement potential of the hemp-component lies in the substitution of the petrochemical epoxy-resin-hardening-system. One possible approach is the use of polymer materials on the basis of renewable resources. As one possible example, reference should be made to the research and development of a novel composite of hemp-fibres and plant-oil-resin (PTP), which will be used in a prototype after intensive research. An external panel of a passenger bus has been tested in practice since December 2005 on a city bus of the Braun-

schweiger Verkehrs-AG (bus company of Braunschweig in Germany) and is advertised by the company with the slogan "I'm made of hemp and salad oil". The research was awarded an innovation prize 2005 of AVK-TV in the category 'environment'. In the processing of the hemp-fibre/PTP material there is a low physiological hazard for the processing worker, particularly because there are no aromatic emissions. The PTP-resin is not classified a hazardous substance, which considerably reduces costs of transportation and storage. A life-cycle assessment was carried out which clearly showed the ecological advantages against the conventional glass fibre/polyester-composite (Müssig et al., 2006). As shown in this example, if aspects of sustainability are respected for new materials, social requirements can be fulfilled in addition to economic and ecological criteria. The use of materials with considerably reduced physiological hazards does not only have advantages for people in manufacturing, but can even secure a manufacturing location, since the costs for work safety measures can be reduced. This applies in a similar way to the use of local natural fibres that are distinct from fibres from abroad in so far as the value addition chain from plant cultivation to the processed fibre can strengthen rural structures. In the next few years this aspect will gain considerably in importance within the EU. As already stated by Joseph A. Schumpeter, an innovative society is also always a destructive society. Innovations have winners and losers and thus the increasing use of natural-fibre composites will substitute other materials. The turnaround in the use of raw-materials that is emerging worldwide must be accompanied by the criteria of sustainability from an early point, so that the consumption rate of renewable raw materials does not surpass their regeneration rate and the functional capacity of the respective ecosystem is not endangered. Furthermore, the consequences of even more intensive agriculture and forestry for socio-cultural structures must be considered. Renewable raw materials in general and natural fibres in particular will open up new possibilities of application to a much greater degree in the future. If economic criteria and ecological and social requirements are incorporated at an early point in the development process of these products, innovative products that comply with the three essential pillars of future viability – ecology, economy and society – can be implemented.

.....  
**Dr.-Ing. Jörg Müssig** has been working for the project group "Neue Materialien" [new materials] at the Europäische Akademie. He is head of the department "Biobased Products/Sustainability" at the Faserinstitut Bremen e.V. (FIBRE). He is also a member of the "Junge Akademie".  
 A literature list can be requested from the author: [muessig@uni-bremen.de](mailto:muessig@uni-bremen.de)  
 .....

## WORKING GROUPS

## PROJECT ACTIVITIES

■ Project Group **“Responsibility for Future Generations. Implementation of Sustainability in Schooling”**: 13.10.2006 in Bad Neuenahr-Ahrweiler

■ Project Group **“Electrical Power Grids”**: 13.10.2006 in Düsseldorf

■ Project Group **“Pharming. Genetically modified plants and animals as future production site of pharmaceuticals?”**: 27./28.10.2006 in Madrid

## SPOTLIGHTS

**Potentials and Risks of Psychopharmaceutical Enhancement**

■ The project group had its second meeting in Hamburg on 30<sup>th</sup> October 2006. The main goal of this meeting was to settle conceptual problems related to the term “enhancement”. For instance, it is quite common to introduce interventions aiming at enhancement by opposing them to therapeutic interventions. However, views differ widely on the normative implications of this distinction. If an intervention is considered an enhancement, does this preclude it from being a proper part of medicine? Or does it even render an intervention illegitimate? In order to reach at a consensus on these and other conceptual questions contested issues will be addressed in a written form before the project group will meet again in January 2007.

*Contact:*

*Dr. phil. Thorsten Galert, M.A.*

*Phone +49 (0) 2641 973-307*

*thorsten.galert@ea-au.de*

**Workshop on the Societal Framework for the Virtualisation of Urban Life**

■ As announced in the last issue of this Newsletter, the Europäische Akademie, in cooperation with the TU Kaiserslautern, organized the above mentioned expert workshop on 16<sup>th</sup> October in Bad Neuenahr-Ahrweiler. The workshop was introduced by a short description of the background and aims of the TU's and academy's joint project on “Virtualisation – spatial consequences and its societal and technological boundary conditions” (Dipl.-Ing. Allin, TU Kaiserslautern). Dr.-Ing. Dallhammer (Universität für Bodenkultur, Wien) followed with a brief overview on current trends from the European Space Observation Network (ESPON), focussing on economic development, traffic and telecommunication. Lifestyles and their dynamics in urban spaces were described by Professor Dr. Spellerberg (TU Kaisers-

lautern). Professor Dr. Mäding (Deutsches Institut für Urbanistik, Berlin) gave a lecture on the mega-trend “demography” and on its interaction with other trends of urban life. His colleague, Dipl.-Geogr. Floeting, continued with in-depth reflection of the relevant possible consequences of the trend “security” in urban areas. Professor Dr. Hassenpflug (Universität Weimar) concluded his talk with the thesis of the “Re-coding of urban spaces by the internet”. The final discussion ended with the overall result that the observable trends will be a challenge for ongoing spatial planning but that it may be questioned, if spatial planning would have met its goal in-time. In this context, virtualisation of urban life and its consequences may become tip-in-the-scales with respect to the planning task.

The results of the workshop discussion will contribute to the above mentioned project and are planned to be published in the academy's “Graue Reihe” in early 2007.

*Contact:*

*Dr. rer. nat. Stephan Lingner, Dipl.-Geol.*

*Phone +49 (0) 2641 973-306*

*stephan.lingner@ea-au.de*

*General information on working groups:*

*www.ea-au.de*

## NEWS

**International Summer School “Neuroscience and Psychiatric Diseases”**

■ “The Impact of Current Developments in the Neurosciences on the Concept of Psychiatric Diseases” is the title of a summer school in Bonn from 2<sup>nd</sup>–9<sup>th</sup> October 2007, organised by the Europäische Akademie GmbH and the department of psychiatry at the Universität Bonn. The event will offer excellent junior scientists the possibility to discuss their research within an interdisciplinary group of participants and with an international faculty. (The summer school is subject to final confirmation by the Bundesministerium für Bildung und Forschung.)

*Further information will be published soon on*

*www.ea-au.de.*

**Podiumsdiskussion: „Wollen wir den mündigen Bürger im Gesundheitswesen?“**

■ Zum Thema „Wollen wir den mündigen Bürger im Gesundheitswesen?“ nahm Professor Dr. phil. Dr. phil. h.c. Gethmann am 30.10.2006 an einer Podiumsdiskussion teil, zu der die Berlin-Brandenburgische Akademie der Wissenschaften (BBAW) und die Hertie School of Governance eingeladen hatten. Gethmann ist auch Sprecher einer Autorengruppe der Berlin-Brandenburgischen Akademie der Wissenschaften, die

vor kurzem das „Manifest Gesundheitssystem“ veröffentlichte. Er bedauerte, dass sich die derzeitige politische Diskussion nur noch auf Finanzierungsfragen konzentrierte und verwies darauf, dass die beteiligten Wissenschaftler dringend ein „Ausdehnen der Sozialen Marktwirtschaft auf den Gesundheitsbereich“ anraten, wobei „jeder versichert sein muss und die Krankenkassen jeden aufnehmen müssen.“

Professor Dr. Kurt Biedenkopf, Kuratoriumsvorsitzender der Hertie School of Governance, bezeichnete das bestehende Gesundheitssystem als „planwirtschaftliches System“, in dem der Staat eine zu starke Rolle spiele und deshalb eine Vielzahl von Lobbyisten schaffe. Dr. Theo Schröder, Staatssekretär im Bundesministerium für Gesundheit, machte wiederum deutlich, dass der Staat nicht darauf verzichten könne, einen Ordnungsrahmen für das Gesundheitssystem zu schaffen. Der Präsident der BBAW, Professor Dr. med. Günter Stock, forderte Transparenz über die Leistungserbringung und die Kosten, ein zunehmendes Maß an Eigenverantwortung und eine grundlegende Reorganisation des Versicherungswesens mit erhöhten Wahlmöglichkeiten für die Bürger. Insgesamt seien außerdem mehr private Initiativen von Nöten.

*Weitere Informationen unter:*

*www.ea-au.de*

**Master-Studiengang Medizinethik: Akkreditierung erfolgt**

■ Am 30.10.2006 wurde an der FernUniversität Hagen der weiterbildende Master-Studiengang Medizinethik vorgestellt. In Kooperation mit der Europäischen Akademie GmbH und der Universität Mainz entwickelte die FernUniversität unter der Leitung von Professor Dr. phil. Annemarie Gethmann-Siefert ein Studium, das Grundlagen der angewandten Ethik mit aktuellen interdisziplinären Forschungsergebnissen verknüpft. Diese Möglichkeit einer akademischen Weiterbildung und Fortbildung für Ärzte neben dem Beruf ist deutschlandweit einmalig.

Die rasante Entwicklung der modernen Medizin wirft Probleme auf, durch die schwierige therapeutische Entscheidungen entstehen. Das erfordert kundige Gesprächspartner. Ein akademischer Abschluss – wie der Master in Medizinethik und gegebenenfalls eine anschließende Promotion – deckt somit ein gesellschaftliches Defizit.

*Kontakt:*

*Thomas Engel, M.A.*

*Ulrike Henckel, Dipl.-Päd.*

*Telefon +49 (0) 2641 973-310*

*thomas.engel@ea-au.de*

*ulrike.henckel@ea-au.de*

*oder www.medizinethik.eu*

### Kreissparkassenvortrag: „Sind wir Zechpreller zu Lasten unserer Kinder?“

■ Beim diesjährigen Kreissparkassenvortrag in Bad Neuenahr-Ahrweiler am 23.10.2006 stellte Professor Dr. Bernd Raffelhüschen, Institut für Finanzwissenschaften und Volkswirtschaftslehre der Universität Freiburg, die Nachhaltigkeit der sozialen Sicherung auf die Probe. Er berichtete in seinem pointierten Vortrag, der gemeinsam von der Europäischen Akademie GmbH und der Kreissparkasse Ahrweiler veranstaltet wurde, über die demographischen Herausforderungen für die deutsche Renten-, Kranken- und Pflegeversicherung. Große Ungerechtigkeiten sieht Raffelhüschen in der Gesundheitsversorgung, hier sei die Umverteilung zwischen Jung und Alt maßgebend: Die meist gesunden Jungen zahlten mehr ein als die meist kranken Alten. Da die Gesundheitsversorgung aber keine Rücklagen kenne, sondern eine Umverteilung praktiziere, hat die Krankenversicherung bei der demographischen Entwicklung zu mehr Alten ein Einnahmeproblem. Allein dieser „demographische Effekt“ werde die Beitragssätze auf knapp 20 Prozent anwachsen lassen. Die Lösung des Problems sieht Raffelhüschen nicht auf der Einnahmenseite; im Kern sei ein Steuerungsproblem auf der Ausgabenseite zu beheben, da auf Dauer nicht für alle alles medizinisch Notwendige durch die Gesetzliche Krankenversicherung finanziert werden könne – es müsse rationiert werden.

Weitere Informationen unter:  
[www.ea-aw.de](http://www.ea-aw.de)

### Research Fellowship Programme

■ The research fellowship programme offers highly qualified researchers from European countries the opportunity to work at the Europäische Akademie for three to sixth months. The Europäische Akademie now provides a scholarship that covers the costs of living during the stay. Details of the programme can be found on the homepage of the Europäische Akademie: [www.ea-aw.de](http://www.ea-aw.de).

#### Publisher:

Europäische Akademie zur Erforschung von Folgen wissenschaftlich-technischer Entwicklungen  
Bad Neuenahr-Ahrweiler GmbH, Wilhelmstraße 56, D-53474 Bad Neuenahr-Ahrweiler

#### E-Mail:

europaeische.akademie@ea-aw.de, Internet: [www.ea-aw.de](http://www.ea-aw.de)

#### Director:

Professor Dr. phil. Dr. phil. h.c. Carl Friedrich Gethmann (V.i.S.d.P.)

#### Editing:

Katharina Mader, M.A., Phone +49 (0) 26 41 973-313, Fax 973-320, [katharina.mader@ea-aw.de](mailto:katharina.mader@ea-aw.de)

#### Print:

Warlich Druck Ahrweiler GmbH, Bad Neuenahr-Ahrweiler  
ISSN 1432-0150, frequency of publication: 6–10 times per year, 2.700 copies,  
reproduction is permitted with reference to the source, please send two voucher copies.

### PUBLICATIONS

#### Carl Friedrich Gethmann

■ „Wider die Monopole. Gesundheitsreform: Freiheit und Wettbewerb sollten Maßstab sein“, Tagesspiegel 10.10.06 (mit K.-D. Henke)

#### Stephan Lingner/Jerzy Runge/ Jan Maciej Waga

■ „Spatial Planning“ (polish title: „gospodarka przestrzenna“). Working Group Report, in: *Fraunhofer Anwendungszentrum Logistiksystemplanung und Informationssysteme* (ed.) Visionen der Informationsgesellschaft 2016 (DVD)

### GRAUE REIHE

■ F. Breyer, M. Engelhard (eds.), *Anreize zur Organspende*, No 39, 11/06

■ C. F. Gethmann, N. Rohner, K.-U. Schrogl (eds.), *Die Zukunft der Raumfahrt. Ihr Nutzen und ihr Wert*, No 40 (in preparation)

■ M. Decker, *Angewandte interdisziplinäre Forschung in der Technikfolgenabschätzung* (in preparation)

### LECTURES

#### Carl Friedrich Gethmann

30.10.06

■ „Wege zu einem zukunftsfähigen Gesundheitssystem“

Podiumsdiskussion, Berlin Brandenburgische Akademie der Wissenschaften (Berlin)

17.11.06

■ „Bewusstsein, was ist das? Sprache ohne phonetische Verlautbarung – eine Antwort im Geiste Wittgensteins“

Interdisziplinäre Arbeitsgruppe Humanprojekt, Berlin-Brandenburgische Akademie der Wissenschaften (Berlin)

### PERSONALITIES



Bart Nuttin was born in Belgium in 1959. He received his medical and neurosurgical degree at the Katholieke Universiteit Leuven, Belgium. After his Ph.D. in 1996 (“Interleukin-6 and spinal cord injury in the rat”, promoter Professor Jan Gybels, Ph.D.) he was additionally trained in functional and stereotactic neurosurgery by Professor Dr. med. Volker Sturm in Cologne, Germany, and Professor Peter Black, Ph.D., at Harvard Medical School, Boston, USA.

He is now head of the clinic of neurosurgery at the University Hospitals Leuven and is responsible for functional and stereotactic neurosurgery in a multidisciplinary setting. He was president of the Belgian Society for Stereotactic and Functional Neurosurgery (BSSFN) and is now member of the executive committee of the corresponding European society (ESSFN). He is president of the Benelux Neuromodulation Society and member of the Council of the Europäische Akademie GmbH. At the academic level he is professor at the Katholieke Universiteit Leuven, he teaches several courses in neurosciences at the university and leads a lab of functional neurosurgery. He is coordinator of the Erasmus Mundus Master in Adapted Physical Activity (EMMAPA), offered by a Consortium of four universities.

He has been coordinator of several research contracts and has been leading several master degrees and doctoral theses. He received two awards from the “Koninklijke Academie voor Geneeskunde van België”. He has published a series of papers in national and international high impact journals as well as chapters in books. He has applied for four patents. The present topic of his research is electrical brain stimulation in psychiatric disorders and the development of a neuroprobe.

.....  
*Professor Bart Nuttin, M.D., Ph.D., has been a member of the academy's project group "Intervening in Psychic Capacities". Right now the group is finishing its book and will present its results in May 2007 in Berlin.*