des derzeitigen Eintrags „Technikfolgenabschätzung“ im Online-Lexikon arbeitet.

Für die inhaltliche Ausgestaltung dieses Online-Angebots und für weitere Diskussionen über die Leistungsfähigkeit einer Ethik der Technik hat die TA'10-Tagung viele Anregungen geliefert, in dem sie einen interessanten und gewinnbringenden Einblick in den Stand der Ethikdebatte im Rahmen der TA bot.

« »

Eco-efficiency for Sustainability

Report on the 3rd International Conference on Eco-efficiency

Egmond aan Zee, The Netherlands, June 9–11, 2010

by Rolf Meyer and Witold-Roger Poganietz, ITAS

The 3rd International Conference on Eco-Efficiency was organised by the Institute of Environmental Sciences (CML), Leiden University (Gjalt Huppes), and the Graduate School of Economics, University of Kobe (Masanobu Ishikawa). Scientists from industrial ecology and many related disciplines with a varied regional background discussed a broad range of eco-efficiency issues. Eco-efficiency was understood here as environmental intensity of production and consumption: environmental pressure per unit of value added, in the aggregate as Gross Domestic Product (GDP).

1 The Challenge: Good Life for Eight Billion People in 2050

The framing of the conference as laid down in the draft conference statement was ambitious. Starting point of the consideration is that increasing affluence and a globally still growing population creates a heavy burden on the environment. With affluence up 1.5 % per year and a growth of working population of 0.5 % per year on average for the next 40 years, an overall improvement in eco-efficiency performance of 2 % per year will be required to just keep pressures on the environment constant. But, for major environmental stressors, substantial absolute reductions are required. This is necessary as many effects are time-delayed, like climate change and ecosystem deterioration, and many sustainability targets are missed. A balanced win-win in eco-innovation, as an equal improvement of both economic and environmental performance, would not decrease total environmental impact but might even increase it, fuelling the problem. A substantial reduction in total environmental impacts is required. Therewith, the environmental challenge is that by 2050 the pressure on the environment needs to be diminished with a factor 2 to 5 – this means the environmental stress has to be reduced by 50 to 80 %.

The task ahead gets even more demanding because the socio-economic challenge needs to be fulfilled simultaneously: A fourfold increase of Global Gross Product (GGP) will be needed to eradicate poverty, enabling all people a “good live”, having access to basic needs and more.

Meeting both environmental and socio-economic goals means that the world needs to improve eco-efficiency over 5 % per year; this is a factor of 10. This implies an unprecedented improvement in eco-efficiency. The task ahead is even more extreme than these average figures indicate. Imagine a new product-technology combination with an eco-efficiency performance 50 % better than current average environmental intensity. Such a deep improvement cannot be realized in one step. Basic innovations typically require around three decades for substantial market penetration. Even an exceptionally fast market penetration after one decade and a life cycle of twenty five years, being superseded by better technology reaching to an eco-efficiency performance of 50 % after 40 years corresponds roughly to an im-provement of 3 % per year on average. That is just enough to keep pace with the environmental targets to be reached. For a performance improvement of 5 % per year on average, some activities will have to improve much more, as some other activities hardly can reach such improvement figures. Railway transport, airline transport and staple foods probably cannot improve their eco-efficiency with such

drastic figures for decades to come. So other product and technology systems will have to improve even more.

Such extreme improvements in eco-efficiency through technology improvement demand looking for other options such as shifting demand and reducing demand. First option is to consume differently. A definite contribution a consumer may give is to eat less meat and to travel less. However, spending less on one item means spending more on others, and the difference in environmental intensity between mostly considered options is not that big. Drivers for such change are cultural and as yet weak, or they would involve adapted price mechanisms, and in exceptional cases prohibition types of policies. Second, reducing consumption may help achieve overall environmental goals. Reducing consumption means spending less, means working less, and earning less. Not reducing production and income while reducing consumption means investing more, leading to higher consumption later. Consuming less is a core subject of degrowth. Life time working hours differ substantially between countries, in terms of weekly hours, holidays and effective retirement age. Using half of the labour productivity increase of around 2 % for leisure would reduce labour volume and hence consumption substantially. Over 40 years, towards 2050, we would have a rise in consumption of 50 % instead of 120 %. That means a reduction of around one-third of total consumption, as compared to autonomous development without increasing leisure time. Such (relative) degrowth may hence give a substantial contribution to achieving environmental quality, much more than any large scale technology measure. It can reduce the as yet unrealistically high requirements on eco-efficiency improvements as quantified above. By combining eco-efficiency improvement with adapted consumption patterns and with reduced growth, especially of the rich in the world, the substantial absolute environmental improvement as is required for a sustainable world should be achievable. However, an overall reduction of demand (and thus of production) is challenged by the socio-economic demands (see above).

2 Overview: Eco-innovation, Decoupling and Connecting Analysis Approaches

The conference was opened with keynote speakers from all continents covering targets and strategies, and some technical options, giving an introduction on the challenges ahead. Parallel sessions (leapfrogging examples from industry, setting policy targets, creating incentives, food for a prosperous world, innovation for sustainability, sustainability performance measured, green transport, renewable energy and energy optimization, resources in a 3R economy and industrial symbiosis, degrowth and sustainable consumption, biomass for a prosperous world, eco-innovation, measuring sustainability performance) looked into specific options for eco-efficiency improvements in core domains of sustainable development and eco-innovation. The key issues of the parallel sessions were presented to the plenary and were also used as a base for the plenary discussion on the conference statement and the questions for research therein. The discussions were closed with a presentation on "Eco-innovation in the Environment Work Programme 2011" by a representative of DG Research of the European Commission. On the last conference day, diverging approaches to sustainability analysis of technologies and products were presented and confronted in order to connect their different knowledge domains. The conference was closed by final round on the conference statement. Additionally, a number of 1000-words visions were submitted dealing with science integration on sustainability analysis.

3 Biomass and Food: Interesting Common Points Worked out

Overall, the presentations in the parallel sessions were more or less heterogeneous. This applied also for the session "Food for a Prosperous World". Nonetheless, interesting parallels were found. Rolf Meyer (ITAS, Karlsruhe) presented different agricultural production system approaches with potential for pro-poor productivity increase and worked out that their principles have to be translated case by case into production technologies and farmer practices adapted to local situations

in his contribution "Low-input intensification in agriculture – changes for small-scale farmers in developing countries". Ruth Freiermuth Knuchel (Agroscope Reckenholz, Switzerland) analysed the eco-efficiency of Swiss dairy and arable farms, based on data from their "Farm Accountancy Data Network – Life Cycle Assessment". Her results show that correlation between the farming intensity and eco-efficiency is characterised by high variability and depends strongly on the performance of individual farmers. Despite the important differences in agricultural production conditions between developing countries and industrialised countries such as Switzerland, the common points are need for local adaptations in agricultural improve-ments and for addressing farmer's performance, for example by benchmarking, farmer-to-farmer learning and farmer-centred, participatory research and development approaches.

4 Biomass for a Prosperous World

The focus of that parallel session was on the opportunities of mainly wood and lignocelluloses to ease the challenges as presented in the conference statement. The approaches presented were rather different: On the one hand more analytical approaches like environmental reporting (Marileena Koskela, University of Turku, Finland) or ToSIA (Tool for Sustainability Impact Assessment of Forest Wood Chains; Tommi Suominen [European Forest Institute, Finland]), on the other hand more technological options like biorefinery concepts (Lin Luo, University of Leiden, The Netherlands) or lightweight boards (W.R. Poganietz, ITAS, Karlsruhe).

The presentations revealed the ongoing challenge to use publically available information on environmental and economic performance of processes and companies and the lack of them to generate reliable findings on which the eco-efficiency of economic activities could be assessed. Beside that the discussion in the session questioned the sustainability of using wood as an energy carrier. As an alternative a cascade use of wood and woody products was promoted.

5 The Obstacles: Rebound Effects, Problem Shifting and New Drivers

Overall conclusion of the conference was that the improvement of technologies alone will most likely not be sufficient to meet the unprecedented challenge ahead. A decoupling of economic growth from environmental pressure is seen as needed, by means of developing and implementing deep eco-innovations (new technology and product-service-systems), combined with changing consumer demand and mindsets. Opportunities should be identified for influencing consumption volumes and consumption patterns and lifestyle. Analysis will be required into the impacts of, for instance, shifting from work to leisure in the most developed countries, with corresponding less income, but perhaps compensated by a higher quality of life. The environmental impacts of such a shift need to be analysed.

The Conference did not provide evidence that a 5 % eco-efficiency gain per annum would be possible, and recommended further research. These major obstacles were discussed:

- *Rebound effects*: Rebound appears on the individual level when consumers use gains from eco-efficiency (which are often environmental as well as monetary) to buy more of the same product or to buy other products or services which can possibly cause more environment stressing. On the macro-economic level, rebound effects appear when more eco-efficiency generating innovations contribute to an increase of economic growth. On average, the rebound effect could diminish the effectiveness of eco-efficiency measures by 30 to 70 %, or even more than 100 %, also called "back fire". Research on rebound effects was considered to be among the priorities.
- *Problem shifting*: Eco-efficiency measures can initiate a shifting of environmental burdens to other places or environmental compartments. Prominent examples are biofuels which can contribute to the reduction of greenhouse gas emissions from transport in industrialized countries but at the same time provoke higher emissions through direct and indirect land use changes in developing countries, possibly over-compensating the achieved reductions.

- *New drivers*: A shift from innovation to eco-innovation requires new drivers with an explicit focus on eco-efficiency. Drivers or incentives to bring about these changes include the use of communication tools (green marketing or advertising, education, awareness raising campaigns), legislation, pricing and other governmental policies (such as on environment, labour, transport). Individual consumers should be empowered to become concerned citizens. Research on consumer behaviour was considered important, as well as research on pricing as an instrument for social change, and on specific needs and perspectives for developing countries, more in particular on their abilities to achieve eco-innovation, supported by fair technology transfer. A long-list of detailed issues for further research was approved.

« »

„Die Asse säuft ab – Gorleben was nun?“

Bericht von der „Fachtagung zum Salzstock“

Dannenberg, 16.–17. April 2010

von Sophie Kuppler, ITAS

1 Hintergrund

Welche Argumente sprechen gegen eine Nutzung des Salzstocks Gorleben für die tiefengeologische Endlagerung hochradioaktiver Abfälle? Diese Frage prägte die von der Bürgerinitiative Umweltschutz Lüchow-Dannenberg organisierte „Fachtagung zum Salzstock“, für die sich ca. 200 Teilnehmer vom 16. und 17. April in Dannenberg im Wendland einfanden. Die am 2. März 1977 gegründete Bürgerinitiative ist ein Zusammenschluss von über 1.000 Atomkraftgegnern und hat einen sofortigen Ausstieg aus der Kernenergie zum Ziel.[1] Sie engagiert sich maßgeblich gegen die Ernennung des Salzstocks Gorleben als Endlager für hochradioaktive Abfälle.

Anlass, zehn Jahre nach der letzten von der Bürgerinitiative finanzierten Fachtagung Experten aus unterschiedlichen wissenschaftlichen Disziplinen und Organisationen zusammenzubringen, waren die öffentlichen Debatten um die mögliche Einflussnahme von Politikern auf wissenschaftliche Ergebnisse im Auswahlprozess für den Endlagerstandort und die Aufhebung des Gorleben-Moratoriums durch die Bundesregierung.[2] Diese und andere Ereignisse der letzten Jahre sollten von Experten analysiert und bewertet werden. Ziel der Tagung mit dem Titel „Die Asse säuft ab – Gorleben was nun?“ war, die wissenschaftliche Basis der Argumentation gegen den Salzstock Gorleben als Endlager zu erweitern. Neben geologischen Aspekten der Standorteignung spielte die Frage der Angemessenheit des Standortauswahlverfahrens eine zentrale Rolle, die sowohl aus historischer als auch ethischer Sicht diskutiert wurde. Die vortragenden Experten waren entweder universitär oder privatwirtschaftlich tätig, oder einer bürgerschaftlichen Organisation zuzuordnen.

2 Historische Erkenntnisse über die Auswahlverfahren für Asse II und Gorleben

Der Historiker Detlev Möller belegte anhand von Zitaten aus Originalakten die frühe Festlegung von Asse II als Endlager bis zum Jahr 2000, obwohl die hohe Gefahr eines Wassereinbruchs bereits bekannt gewesen sei. Selbst nach dem Entdecken von Deformationen im Gestein 1977 sei zwar die Handlungsnotwendigkeit erkannt, aber nichts getan worden. Eine Übertragbarkeit der Erfahrungen mit Asse II auf den Standort Gorleben sah Möller nur indirekt dadurch, dass Asse II die einzige Probemöglichkeit für die Endlagerung in Salz gewesen sei, auf deren Basis die Genehmigung für Gorleben erteilt werden sollte.

Matthias Edler, Atomexperte bei Greenpeace, präsentierte die Ergebnisse einer Aktenschau zum Auswahlverfahren des Standorts Gorleben. Gegenstand dieser Aktenschau waren die Studie der Kernbrennstoff-Wiederaufbereitungs-Gesellschaft (KEWA), die im Auftrag des Bundesministeriums für Forschung und Technologie von 1974 bis 1976 durchgeführt wurde, die Studie des Interministeriellen Arbeitskreises der niedersächsischen Landesregierung (IMAK; 08/1976–