ESD Office: c/o IEI, 25/5, Borebank Road, Benson Town, Bangalore - 560 046, India
E-mail: ieiblr@vsnl.com
http://www.ieiglobal.org/esd.html

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INTERNATIONAL ENERGY INITIATIVE
25/5, Borebank Road, Benson Town,
Bangalore 560 046, India

There is growing excitement around the world, in the marketplace, with international bodies and with policy-makers, about the rapidly developing international trade in biomass and biofuels. More and more modern bio-energy-fired facilities use imported biomass streams and more and more biomass resources are becoming available from regions that previously did not utilise them due to lack of demand. Until the end of the 1990s biomass was largely seen as a regional energy source not to be transported over large distances. In the meantime, high fossil energy prices and policy support for modern bio-energy (especially in Europe) pushed demand for biomass. Continuous technology development, learning and growing experience with modern, efficient bio-energy technologies and organisation of (international) supply chains now make bio-energy a more and more attractive alternative in the energy market. Experts now estimate that in the recent past and over the coming years, the volumes of biomass and biofuels traded over the globe are likely to *double* each year. This is a unique observation in the renewable energy field as a whole. It has already given rise to new International Energy Agency (IEA) scenarios including rapid "ramp-up" projections for biofuel production and use on a global scale.

These insights are becoming evident from the assessment work of IEA Task 40 on "Sustainable International Bio-energy Trade – Securing Supply and Demand" under the IEA Bio-energy Agreement. This new task, started in 2004, now with nine countries on board and with the Food and Agricultural Organisation (FAO) of the United Nations and the World Bank as active members, serves as a unique platform to map these recent developments, highlight opportunities, exchange experiences on international bio-energy trade schemes and provide strategic advice on how sustainable international markets can be developed further.

In this special issue of Energy for Sustainable Development, the links between international bio-energy trade and socio-economic development and how sustainable bio-energy production could be realised are evaluated from different angles. Current developments, drivers, barriers, future potentials for international bio-energy markets and concrete examples are discussed. Subsequently, implications for possible exporting countries are explored.

The contents of this issue are partly based on a workshop organised by IEA Task 40 and Task 29 on "Socio-Economic Drivers in Implementing Bioenergy Projects" and the Energy and Poverty Thematic Group of the World Bank. This workshop was hosted by the World Bank during the Energy Week in March 2005.

A key element of the workshop was to discuss how projects involving development of rural areas and biomass production for the international market could be realised and organised. This special issue presents a selection of issues and analyses presented and discussed at the workshop. More information, e.g., on a preceding workshop hosted by FAO in October 2004 and an event on sustainable biomass production for the international market in Brazil (December 2005) can be found at the Task 40 website: www.bioenergytrade.org.

The introductory article of this issue, by Julije Domac and André Faaij, sets the scene; the potential links between the emerging international bio-energy markets, the long-term global potential and socio-economic development of rural areas are evaluated. Frank Rosillo-Calle and Arnaldo Walter provide an overview of the most rapidly growing globally traded biofuel: ethanol. The expansion of production capacity worldwide and growing demand in many nations make ethanol a front-runner in global biofuel trading, despite trade barriers and discussions on the sustainability of rapid expansion of production capacity. Bengt Hillring and Miguel Trossero report on global wood energy markets and developments there.

Despite wood having a less mature market than ethanol, the authors observe and expect strong growth as well, at least in pellets.

Sub-Saharan Africa is a key region for future biomass production and the potential of this region is vast. Johnson and Matsika evaluate the possibilities for expanding ethanol production from sugar cane for the region. Ethanol production capacity, also for the export market, could already be expanded in various countries in the shorter term. Subsequently, a clear link with the positive implications for rural economies of the producing regions is made. Key bottlenecks include the need for more competitive and larger-scale production, investments in infrastructure (for export) and import tariffs of potential importers. Batidzirai, Faaij and Smeets provide an analysis of the biomass production potential of Mozambique, focusing on production of wood for second generation biofuels (such as Fischer-Tropsch diesel). They point out that the potential and economics of such schemes are striking, highlighting the need to gain practical experience and increase capacity-building in the region to develop those capabilities for the medium term.

Hansson, Berndes and Börjesson analyse the implications of developing international bio-energy trade from the Swedish perspective, highlighting the opportunities, but also possible implications for global freight patterns, infrastructure capacities and, fundamentally, the sustainable development of biomass production capacity in developing regions.

If indeed the global bio-energy market is to develop to a size of 400 EJ per year over this century (compared to 430 EJ current total global energy use), which is quite possible given the findings of recent global potential assessments, the value of that market at US$ 4/GJ (considering pre-treated biomass such as pellets) would amount to some US$ 1.6 trillion per year. Logically, not all biomass will be traded on international markets, but such an indicative estimate makes clear what the economic importance of this market can become for rural areas worldwide, as are the employment implications. Considering that, very roughly, a quarter of the above-mentioned 400 EJ could be covered by residues and wastes, another quarter by biomass production schemes that regenerate degraded and marginal lands, and the remaining half from current agricultural and pasture lands, some 1 billion ha worldwide may be involved in biomass production. This is some 8 % of the global land surface and one-fifth of the land currently in use for agricultural production.

Across the contributions to this special issue, there is an overall agreement on the importance and potential of international bio-energy trade and biomass markets for developing modern bio-energy further on a global scale. The opportunities for developing regions are evident.There is also agreement on the need for safeguards to avoid too rapid growth and unsustainable practices. Certification, preferably starting from an internationally accepted framework but developed, applied and verified in detail at a regional level with strong stakeholder participation, seems to be a crucial way to achieve that.

ESD is an ideal journal to get this message out, since it deals with sustainable energy futures and because it is widely distributed in developing countries. It is exactly there that the possibilities and potentials for modern bio-energy production, including export, are largest and at the same time the need for development of rural areas is the highest. These crucial issues, global bio-energy markets and rural development, merge in a formidable way. This sheds a new light on the bio-energy option; bio-energy *should be seen as a global energy commodity* and the fact that we are seeing the market really develop in this direction makes clear that we should better prepare for this.

Given the scale of the market, bio-energy trade could provide one of the most important sustainable development pathways for decades to

come: developing bio-energy as the key sustainable and carbon-neutral alternative to fossil fuels and at the same time mobilising rural areas around the world into becoming key energy producers and exporters could contribute to poverty alleviation and further development.

Although international bio-energy trade and markets are developing very rapidly and the future looks bright given demand and potential supplies, there are also many barriers that could disturb or at least slow down a sound development of such markets. Moreover, there are important concerns about competition for land that may be in conflict with food production, water resources and biodiversity protection. Although biomass production may well provide a crucial strategy to enhance sustainable land-use management, negative developments should be avoided, e.g., by clear standards and best-practice guidelines for (the design of) biomass production systems and their integration in agricultural areas. Gaining experience with certification, developing the desired international frameworks, removing trade barriers and showing best-practice operations through export-oriented pilot projects in a diversity of developing countries and different rural areas are crucial in the short term. Good examples, successful business models and sound sustainability frameworks can guide market forces in a sustainable direction. If we succeed, we may be looking at the first stages of the Green OPEC (or BIO-PEC) of the future!

I would like to thank ESD for providing the opportunity to report on this subject with a special issue. I look forward to many more reports in the journal on experiences and analyses of this exciting field from all corners of the world.

André Faaij

Corrigendum

In the article "Social, economic, and environmental impacts assessment of a village-scale modern biomass energy project in Jilin province, China: local outcomes and lessons learned", starting on Page 50 of Volume IX, No. 4 of ESD, the last paragraph of the left-hand column on Page 55 begins with the sentence "At the producer gas cost projected by the original business plan, Y 0.2/m^3, LPG would have been at least 50 % more expensive (on an energy basis) than LPG as a cooking fuel." It should read "... LPG would have been at least 50 % more expensive (on an energy basis) than producer gas as a cooking fuel." We deeply regret the mistake created by our editing of the original text.

– Editorial Team, ESD

Call for papers for special issues on

1. climate change mitigation and sustainable development

2. sustainable transport

As our readers are aware, ESD frequently publishes special issues dedicated to specific areas. This serves several purposes. ESD may choose to focus on an area which ESD or IEI views to be important to the subject of energy and sustainable development and/or which has not been adequately covered in past issues. Moreover, concentrating on a given area, the editors can hope to cover major topics within the specific area in question in a single issue. The resulting collection of papers would be better organised rather than a random mixture of papers, avoiding both duplication and omission of content. The idea is, of course, not to stifle differences in opinion, so that different perspectives on controversial issues are welcome.

The process of selection of papers for a special issue is somewhat different from that of normal issues of ESD. We either invite authors known to us to write about specific topics, or invite any interested author to submit an *abstract* for the consideration of the editorial board. Once we have an idea of the breadth of the papers available, we may solicit other authors to fill in any gaps, if possible. When we have a reasonable list of papers for the projected issue, we would request all selected authors to submit full articles. Once submitted, all papers would be subjected to the normal peer review process, and revisions if necessary, before publication. Currently we have identified two areas where we would like to compile ESD special issues. These areas are:
1. climate change mitigation and sustainable development
2. sustainable transport

Climate change mitigation and sustainable development

An increasing body of literature confirms that climate change is real, with substantial impact on our planet. There is also a wide range of publications covering the science of climate change, its impact, and strategies for adapting to and mitigating climate change. Noteworthy are the reports of the Intergovernmental Panel on Climate Change (IPCC), which is in the process of preparing its Fourth Assessment Report. The proposed ESD issue will focus on areas that are common to the areas normally covered by the journal and climate change. These are likely to be in the areas of *mitigating* climate change, but the special issue will not be limited to this if interesting topics are offered by prospective authors, linking climate change and sustainable development. We invite all interested authors to submit abstracts in this area, preferably by the end of April 2006, so that we may start the task of projecting the contents of the special issue, which we would like to publish in time for presentation at the UNFCCC (United Nations Framework Convention on Climate Change) Meeting of the Parties (MOP) at year-end 2006.

Sustainable transport

Energy use in transport has been growing at a faster pace than in other areas, a trend that is likely to continue, in both industrial and developing countries. Transport is also responsible for a major share of air pollution and for a very large share of premature death and injuries through traffic accidents. While some countries have made significant progress in reducing air pollution and traffic accidents, others are lagging far behind, and all can do much more. Transport infrastructure involves large investments and land requirements. While the diversity of problems associated with transport is large, so also is the range of options available to resolve these problems: from narrowly-focused solutions such as vehicle fuel efficiency and switching to renewable fuels, to promoting public transport and inter-modal shifts in freight traffic, and changing urban design to reduce the need for transport. Past articles in ESD have focused only on some energy aspects of transport. We believe that the issues involved in sustainable transport are often interrelated. We therefore invite all interested authors to submit abstracts in any area relevant to sustainable transport by the end of April 2006, preferably earlier. We will analyse the abstracts presented as they arrive, and in the course of 2006, project an appropriate table of contents for this special issue. If we are able to identify an adequate number of papers covering a range of issues associated with sustainable transport, we could look for publication in March or June 2007.
Please send your ideas to the Technical Editor at gdutt@fibertel.com.ar.