Renewable Energy for Development

STOCKHOLM ENVIRONMENT INSTITUTE – NEWSLETTER OF THE CLIMATE AND ENERGY PROGRAMME

SEI • December 2007 | Vol. 20 | No. 2 | ISSN 1101-8267

Financing the path to renewable energy enterprises

by Eric Usher, United Nations Environment Programme (UNEP)

Global renewable energy markets have evolved rapidly in recent years. Investment has gone up, costs have come down, and the need for new energy alternatives has only increased in importance. And yet in the developing world today we are only scratching the surface of what can—and must—be done in order to mainstream new, more sustainable supply options into the energy mix. Besides the need for an enabling policy framework and a level playing field, the other barrier to uptake has been the lack of financing required to help these fairly capital intensive technologies compete with conventional options.

Most renewable energy companies in developing countries are frustrated by the lack of interest in their businesses from finance institutions, either to finance their operations or to lend to their customers. They claim that banks don't understand their businesses, their technology or their customers and generally lack incentives to provide the kind of financial services they need most.

UNEP has been working for some time on this disconnect, trying to increasingly engage the financial community in the clean energy sector, and in so doing, helping project developers gain access to appropriate forms of financing. To implement a business activity, an entrepreneur or developer needs various forms of capital, each usually coming from a different part of the finance sector. These capital needs follow a *finance continuum* that varies somewhat by business activity, but still has some common components (see graphic on p. 3). For distributed small-scale technology businesses, the finance continuum begins upstream with the seed or *risk* capital needed to start a business. It then shifts to commercial *bank lending* to finance inventory and operations, and eventually might involve *end-user consumer* or *micro-financing* for the business customers.

Today, there are many gaps in this continuum which prevent the commercialization of renewable energy and market scale-up, and therefore dirtier, conventional technologies from being displaced. UNEP's approach is to assess these financing gaps and, when needed, to support public interventions that allow markets to grow, demonstrating new avenues to scale up public and private sector investments in clean energy. UNEP has a number of programmes under way,

Photo: Selco

Installation of solar panels, India

Continued on p. 3

In this issue:

From the editor

Today the global community is faced with two main energy challenges: meeting the energy needs that are essential for economic growth and fighting poverty; and reducing the threat of regional and global environmental disruptions, particularly addressing the vulnerability of societies to the negative impacts of climate change.

The access challenge

The first challenge relates to access to modern forms of energy, which is a prerequisite for economic growth and poverty reduction and affects all aspects of development—social, economic and environmental. About 2.4 billion people rely on traditional biomass (such as wood, charcoal or dung) as their principal source of energy, which contributes to harmful indoor air and environmental degradation.

The environmental challenge

The second challenge stems from the environmental, climate, and public health impacts of growing energy demand: air pollution, water scarcity and habitat degradation all undermine the livelihoods of the world's poor. They jeopardize progress towards the Millennium Development Goals (MDGs), and obstruct poverty reduction in general, because poor communities depend on healthy environments for their livelihoods, and are often the most vulnerable to environmental degradation.

SEI climate and energy

Emerging from the energy-climate-poverty nexus, the Climate and Energy Group at SEI-Stockholm focuses its work around three themes:

- Improving energy **A**ccess,
- Advancing modern **B**io-energy resources
- Supporting **C**limate policy

All three themes have the common goal of providing useful policy analysis to empower sustainable **D**evelopment strategies. This approach is referred to as **A-B-C** for **D**.

Improving energy access

The **A**ccess theme includes the Sida-funded programme on Strengthening Energy-Environment-Development Processes (SEED), which aims to generate new knowledge and enhance institutional capacity on energy access, and provide strategic decision support and policy research. Sub-projects within SEED include support to the East African Community's energy-access policies, economic analysis of household cooking choices, and promotion of rural/renewable energy entrepreneurship.

Advancing modern bio-energ y

The modern **B**io-energy theme is addressed through various initiatives that consider how and in what context expansion of modern bio-energy production and trade can support sustainable development, with a special emphasis on increasing benefits to rural areas and to small-scale farmers. SEI is a key partner in the Competence Platform on Agro-Energy Systems in Africa (COMPETE), which includes 40 partners and is supported by the European Commission's Research Programme. SEI is also engaged in several research projects on the relation of modern bio-energy to livelihoods creation and rural development.

Supporting climate policy

The **C**limate policy theme includes participation in major EC-funded research projects such as ADAM, which focuses on the trade-offs and conflicts between adaptation and mitigation policies. The Sida-funded Climate for Development Programme (**C**for**D**) operates squarely at the science-policy interface in order to build institutional capacity and conduct broad assessments on mitigation and adaptation options. SEI staff participate in major climate policy events, including the UNFCCC Conference of the Parties in December in Bali.

This edition of the RED covers issues across all the above themes, as well as bringing to light and discussing the important linkages between them.

20 years of the RED newsletter

The RED newsletter has now reached its twentieth year of publication! We are interested in your views on what you as the reader would like to see covered in a newsletter of this type. Your feedback is especially important at this stage because we are considering major changes in the format and content of the newsletter in the future (for details on how to give us your feedback see page 16). Happy reading, and we look forward to a discussion with you on supporting renewable energy for development.

Francis X. Johnson,
Research Fellow, SEI

The Stockholm Environment Institute (SEI) is an international research institute focusing on sustainable development. The Institute works through an international network of centres, associates, and field staff around the world.

The Climate and Energy Resources Programme is concerned with improving access to environmentally friendly energy services, promoting renewable energy and energy efficiency, and advancing global cooperation on climate change.

This newsletter is supported by the **Swedish International Development Cooperation Agency** (Sida). The newsletter is distributed free of charge and is also available through the SEI website.

The views expressed in the articles in this newsletter are those of the authors and not necessarily those of SEI nor of Sida.

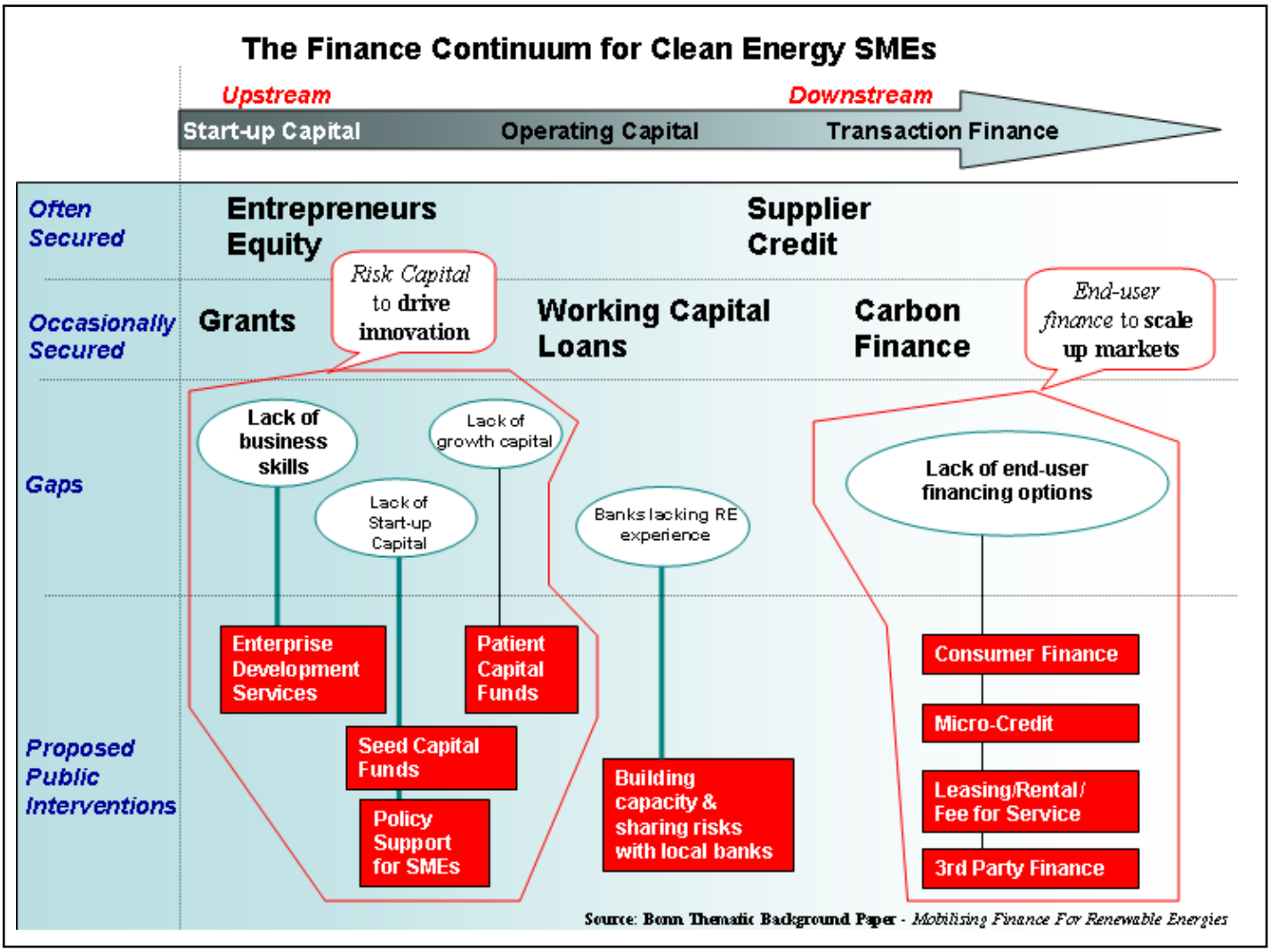
For further information contact **Solveig Nilsson**, SEI. solveig.nilsson@sei.se

Managing Editor: **Fiona Zuzarte**
Editor: **Francis X. Johnson**
Publisher: **Arno Rosemarin**
Layout: **SEI/Solveig Nilsson**
Printer: **Grafisk Teknik**

ISSN 1101-8267
Printed on chlorine-free, 100 % recycled paper

Kräftriket 2B
SE-106 91 Stockholm, Sweden
Tel +46 8 674 7070
Fax +46 8 674 7020
E-mail postmaster@sei.se
www.sei.se

Financing the path ... continued from p. 1



The finance continuum for clean energy small- to medium-sized enterprises (SMEs)

targeting two specific gaps in the small-scale technology businesses finance continuum—the first at the early seed-finance stage of enterprise development, and the second at the market expansion stage, when lack of end-user financing can constrain market growth.

Since 2000, UNEP's Rural Energy Enterprise Development programmes have been providing entrepreneurs with seed financing and associated technical support for developing and commercialising clean energy products and services. Volume 16, no. 3 of RED included an article on the African Rural Energy Enterprise Development (AREED) programme, which has invested in 34 clean energy enterprises in the areas of crop drying, efficient cook stoves, solar water heating, wind-pumps, biofuels and others. One follow-on initiative, jointly managed with the Asian and African Development Banks, is the Seed Capital Assistance Facility, a 9 million USD programme launched to engage commercial energy investors in the clean energy sector. By sharing transaction costs and buying up investment returns, the facility will help local sustainable energy entrepreneurs access innovation financing from the mainstream investment community.

Where the growth of small-scale clean energy technologies already commercialized on a "cash-and-carry" basis is constrained by a lack of end-user financing, UNEP has been implementing credit support programmes that help local banks build their first clean-energy loan portfolios. Such programmes are today under way in India, Tunisia, Morocco, and China. Although the local context for each programme varies considerably, there are many common elements that have helped to build experience and best practice that can be transferred to other regions.

Financing solar home systems in India

A first bank partnership was launched in 2003 between UNEP, the UNEP Risoe Centre, and two of India's largest banking groups (Canara Bank and Syndicate Bank) that provided consumer financing for solar home systems at preferential interest rates. Although

India had one of the most dynamic photo-voltaic (PV) industries in the developing world, at the time there was little bank financing available to customers, causing severe constraints to market growth. The programme involved providing Canara and Syndicate customers with an interest rate subsidy and partial guarantee, marketing support, and a vendor qualification process.

During the three years of the programme, the banks financed 19,533 solar home systems providing electric lighting to over 100,000 people. The subsidy was removed over time, leaving a commercial credit market in place for financing solar home systems. Although the sector was pretty much a cash-only business in 2003, today over 50% of sales are financed through Canara and Syndicate and a number of other banks who have entered the market.

Photo: Tata BP Bankura

Shop in Bankura, India, powered by solar energy

Financing solar water heaters In Tunisia

A second such end-user financing effort called PROSOL was launched in Tunisia for solar water heating under the Mediterranean Renewable Energy Programme (MEDREP). This facility was specifically aimed at displacing use of liquid petroleum gas (LPG), the conventional choice for water heating in Tunisia. LPG prices are 35% subsidised, and with rising oil prices, are starting to have a significant impact on the public treasury. PROSOL was similar to the Indian programme in that it helped local banks provide low-cost financing to solar end-users, although in Tunisia the state utility, STEG, also played an important role by recovering the monthly loan payments via their customers' utility bills.

Photo: Selco

Solar lights installed in a home, India

In Tunisia, the commercial lending rate for similar loan products was 14%, which UNEP initially brought down to 7%. With the utility acting as collection agent, the credit risk (i.e., likelihood of default) decreased, allowing the banks involved (the leaders being Amen Bank and UBCI) to agree to a further 7% reduction.

PROSOL began operating in April 2005, and by the end of 2006 over 20,000 solar water-heating systems were installed, more than doubling the size of the market from 2001, the previous best year. After 12 months UNEP's subsidy was gradually removed and the banks continued to finance the solar loans on their own terms. Based on the quick uptake in the sector, and the increasing level of bank engagement, the government passed legislation in late 2005 that made solar water heaters eligible for the energy subsidy, previously only provided to LPG technology. This helped to level the playing field, although a complete removal of the subsidy would be the optimal long-term solution.

As in India, the Tunisian market responded well to the impetus and credit financing seems to be playing an important role. The Tunisian Government is now pushing to scale up this programme, targeting 250,000 m^2 of installations by 2009, which would require a total investment of about 125 million USD.

Of course not all markets are the same and not all approaches are uniformly successful. A hotel-focused programme was initiated in Morocco in 2006 to finance solar water heaters, and the uptake has been slower. Efforts have also been made to support similar programmes in Egypt, with limited success because of their artificially low energy prices. Clearly, financing is only one link in the value chain that also includes technology, service in-

frastructure, a stable policy framework and customer willingness to switch energy services or systems.

A number of new bank-partnership programmes are in development, including an initiative sponsored by the Global Environment Facility that will support bank lending for solar water heating in Albania, Algeria, Chile, India and Mexico. A range of approaches will be used, including a green-mortgage product in Mexico that will offer preferential financing for newly built homes that include solar systems or other energy saving technologies.

With support from the Swedish International Development Cooperation Agency (SIDA), a new programme is starting that will support clean-energy social-enterprise initiatives in Africa, offering both seed financing to get new community-based business models up and running, as well as end-user financing support through local micro-credit institutions.

Photo: Prosol

Solar thermal installation, Tunisia

Linking bank lending to policy making

An interesting lesson emerging from these bank-partnership programmes is that there can be an effective feedback loop from the actions of the banking community to policy makers. When banks begin to scale up lending to a clean energy sector they send a positive signal that the technology is mature and ready to play a significant role in the country's energy mix. This change in perception can go a long way towards convincing policy makers of the need for shifts in policy frameworks from a narrow "technology demonstration" approach to a broader fiscal or regulatory approach.

This has happened both in Tunisia, with the change in energy subsidy policy, and in India, where the government is considering shifting its PV support programme away from capital subsidies and towards the interest subsidy approach. This contradicts the conventional wisdom that investment only engages once the right policies are in place. UNEP experience has been rather that financing and policy development evolve somewhat in parallel, with one community constantly influencing the actions of the other.

The field of climate mitigation offers one example of this policy/finance interlinkage. As the markets for CO_2 offsets get under way, carbon revenues become a new component of the finance continuum and their efficacy in creating permanent, verifiable emissions reductions provides feedback to climate negotiators. UNEP has initiated a number of Clean Development Mechanism (CDM) support programmes that work with host governments, project developers and carbon investors to level the playing field; empower the least developed countries to participate in the carbon market; and shape a more equitable post-Kyoto regime.

Shifting gears

Today, banks in many developing countries have sufficient liquidity (i.e., capital) and are generally seeking to develop new loan products. It is the combination of the unfamiliarity with renewable energy technologies and inconsistencies in the quality of product and service offered by the different vendors that can make lending difficult for banks. In these situations development agencies and international financial institutions need to shift away from simply relying on traditional credit-line approaches and start to focus on credit enhancements and other "soft" support that help banks set up their first loan portfolios and gain experience with clean energy sectors. They are cost-effective: the programmes in India and Tunisia have each cost around 1 million USD, far less than is usually needed for conventional public finance programmes; and are catalytic, because each will generate 5 to 10 million USD in commercial financing to between 10,000 and 20,000 household systems.

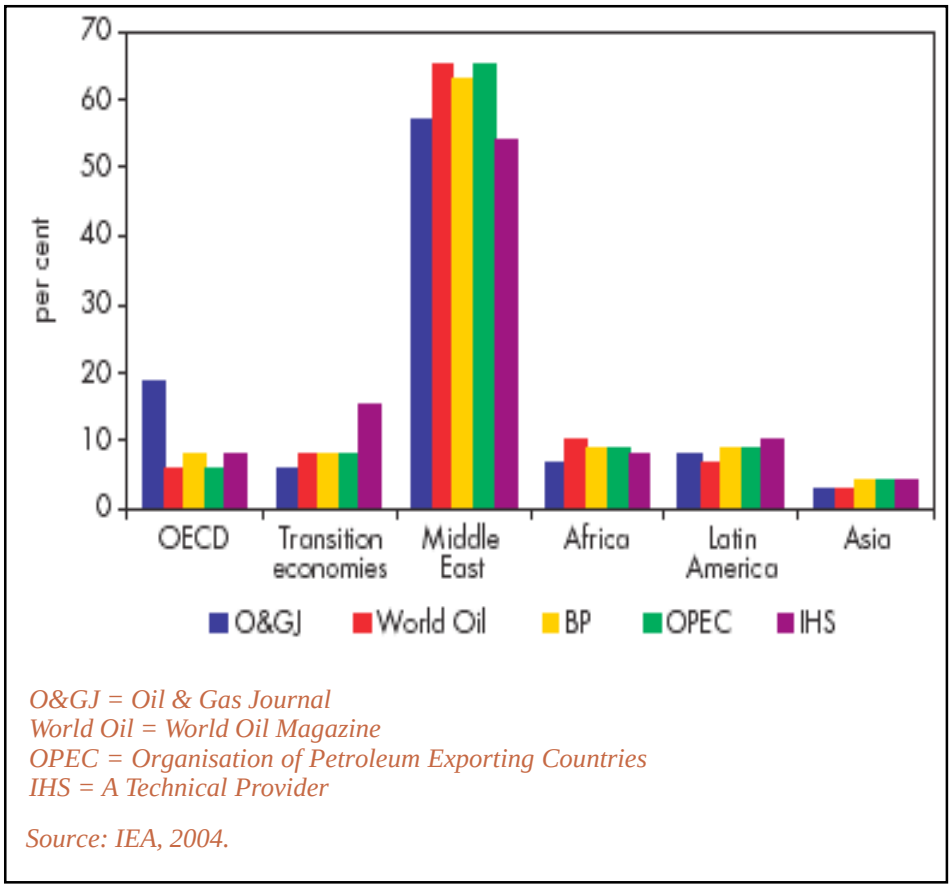
Are these various efforts enough to drive a shift in the finance sector's view on clean energy? Our experience has been that once loan portfolios get beyond 10,000 systems, then the sector is considered a reasonable commercial credit market and the banks will generally take it from there. Getting past this 10,000 threshold could help accelerate clean energy uptake in many countries. ■

Eric Usher leads UNEP's sustainable energy finance programme, working to engage the finance sector in the shift towards cleaner energy infrastructure. He has recently relocated from Paris to Stockholm and can be reached at eric.usher@unep.fr

Asian biofuel development at a crossroads

by Yong Chen, SEI and Jinyue Yan, Royal Institute of Technology (KTH), Sweden

Asia has the smallest share of proven oil reserves of all world regions, but is projected to increase its share of consumption from less than 17% today to one quarter of the world's oil by 2030. Over the past few years, oil price hikes have been observed to counteract economic growth for oil importers and in the long-term can undermine the security of energy supply. Biofuels, as one of the most promising alternatives to petroleum fuels, could provide a strategic opportunity for some developing countries to offset or bypass the oil economy.



O&GJ = Oil & Gas Journal
World Oil = World Oil Magazine
OPEC = Organisation of Petroleum Exporting Countries
IHS = A Technical Provider

Source: IEA, 2004.

World Energy Outlook, 2004: regional share of proven oil reserves

For Asia, biofuel development has reached an important crossroads. Which developmental pathway should Asia adopt: proven but less efficient first generation technologies or cutting-edge second generation technologies?

Development choices

There are obvious pros and cons to such strategic choices. Arguably, taking the second generation path would avoid the problems and issues associated with first-generation technologies; hence it would be cheaper in the long-term because of a variety of potential savings. Nevertheless, such an approach may not always be affordable in the short-term for developing countries, which in many cases are relying on old-fashioned technologies to accumulate sufficient wealth to reach a stage of development that enables a technological "take-off".

On the other hand, if Asia uses the proven first generation technologies developed by biofuel pioneers, the technological gap between the first-movers and the latecomers may widen, because biofuel technology and its deployment advances incrementally, often through learning-by-doing. More importantly, would Asia be able to tackle the intricate issues associated with biofuel production within its special context of high population density, rapid urbanisation with increasing urban poor and already fragile ecosystems in many areas?

One case is the Chinese grain-based bioethanol production strategy, which had planned to convert old stored grains—mainly corn and wheat—into ethanol to blend with gasoline. As a result, energy security, environmental protection and rural economic development would all potentially be addressed. Bioethanol can be seen as a stone that could kill several birds.

However, spurred by the rapid development of grain-based bioethanol, food prices have risen dramatically. By 2006, two pilot projects with a total annual processing capacity of more than 1 million tonnes of grain bioethanol provided about 10 million tonnes of gasohol with 10% alcohol. This has made China the third largest bioethanol producer in the world after Brazil and the US.[1] The growth rate of processing capacity and output is far higher than that of the grain yield and so has affected food prices. Securing the food supply for China's large population is crucial for Chinese politicians. A rapid increase in food prices would not only undermine the stability of Chinese society, but the increasing number of poor migrants to urban areas would probably be worse off. The rapid modernisation of the Chinese bioethanol industry may improve environmental performance, but it remains unclear which technology trajectory China will adopt given the major implications for China's ecological systems.

[1] Energy Bureau of National Development and Reform Commission of China (2007). Renewable Energy Law and Relevant Policies. April, 2007.

Photo: Jiaiang Gao/Wikipedia

Rice terraces in Yunnan Province, China

In a surprise move following several years of promotional policies, in 2006 the State Council of China put an urgent brake on the expansion of grain-based bioethanol production. In the ensuing official decree the National Development and Reform Commission (NDRC) of China, the key policy maker in China's bureaucracy, declared that all supportive policies and promotional schemes would be phased out by 2008, and that no new grain bioethanol projects would be permitted. In addition, all existing pilot projects would be reviewed and their future capacity to expand would be limited. NDRC strongly advised that any future bioethanol production should be based on non-grain and cellulose-based biomass.

Domestic vs. international markets

Asia is facing a dilemma as to where Asian-produced biofuels should be supplied: to international markets to generate export income or domestic markets to enhance energy security?

Because domestic and international markets coexist, the trade in biofuels, albeit small, is growing. In today's increasingly globalised world, biofuels are seen as a tradable commodity mainly from developing countries (where there is a growing gap between demand for and supply of oil) to developed countries to meet transportation needs, fuel demand and GHG reduction commitments under the Kyoto Protocol. This is mainly a result of lower production costs in developing countries. For example, Malaysia and Indonesia are expanding their palm oil cultivation in the hope of exporting at least 30% of the bio-diesel they produce to meet rising European demand in coming years. One of the key drivers for the drastic increase of non-state-owned biofuels processors in China is the potential international demand, particularly from the European Union.

Currently, the trade barriers to the international biofuel business are high because of various concerns raised by the potential traders: some countries are not yet convinced about the enhanced energy security from imported biofuels; some worry about potential deforestation issues already observed in Brazil; some are skeptical about the advocated environmental benefits; and many are concerned about the potential effects on their own rural economies.

Some Asian countries such as China, India and the Philippines are trying to create or enlarge domestic markets by introducing a blending mandate to reduce the growing dependency on imported oil. In China, for example, the formation of a coalition between China National Petroleum Corporation (CNPC) and governmental authorities such as the Ministry of Agriculture, the State Forestry Administration and local government partners, is intended to keep the fuel produced within China for its own use. India's jatropha and pongamia strategies are not only intended to balance the disparity between urban and rural development but, more importantly, to decrease oil imports. India's expenditure on imported oil rose by 16% in 2003 compared to 2001—equivalent to a 3% decrease in GDP (TERI, 2005).[2]

Remarks

To deal with the complicated strategic issue of developing biofuels as substitutes for petroleum liquid fuels a holistic, long-term perspective is needed, with a proactive approach rather than just reactive measures.

Different strategic choices in technologies and market development may lead to very different prospects for Asian biofuel development. ■

Contact yong.chen@sei.se or jinyue.yan@ket.kth.se

[2] TERI, 2005. Liquid biofuels for transportation: India country study on potential and implications for sustainable agriculture and energy. Report prepared for the Deutsche Gesellschaft für Technische Zusammenarbeit (GTZ) GmbH, New Delhi, 2005.

Highlights of first Africa high-level biofuels seminar

Fiona Zuzarte, SEI

The potential of biofuels as an alternative to fossil fuels, combined with their wide range of applications as clean forms of energy, has attracted worldwide interest. This has important implications for those countries with the vast resource potential to grow the necessary feedstock.

Photo: IISD

Ministerial panel

In Africa, the efforts to develop the bioenergy sector are still nascent, but it is becoming a bigger priority with the recognition of the multiple benefits it can provide to the region. In addition to gaining energy security and generating foreign exchange through exports, Africa's comparative advantage in biomass growth provides an opportunity to revitalise the agricultural sector, encourage rural development, create new jobs and increase much-needed access to modern energy services.

To ensure that this sector develops sustainably, opportunities and challenges should be addressed from an African pespective by involving key stakeholders in mapping an action plan for the continent. In this context, a three-day seminar on biofuel development in Africa was held at the African Union (AU) headquarters in Addis Ababa from 30 July until 1 August. Entitled Sustainable Biofuels Development in Africa: Opportunities and Challenges, the seminar was organised by the AU, the UN Industrial Development Organization (UNIDO) and the Government of Brazil, with assistance from SEI. The event was well attended, with over 250 high-level representatives from the AU, regional economic communities, development partners, the government of Brazil, private sector NGOs and several biofuel experts.

The seminar provided a platform to highlight the current status of biofuels in Africa, to brief policy makers and the private sector on the potential, the trade-offs and the risks of biofuels, and to share experiences from various national and regional experiences in Africa and Brazil. There was an emphasis not only on the external influences fuelling the growing importance of the sector, such as energy security and diversification, export market potential, and Clean Development Mechanism (CDM) financing, but also the internal drivers connected to rural development, including creation of agro-industrial employment, new revenue streams, and improving energy access.

The various presentations and debates involved scientists, policymakers and governmental representatives, and participants from NGOs, non-profit institutions and relevant stakeholders. Regional highlights included the West African jatropha-derived biodiesel programmes in rural applications, Southern Africa's ethanol activities, and biogas systems in Ghana. Discussions encompassed the policy, science and resource aspects of the bioenergy economy. These dialogues served to emphasise the opportunities and challenges around technology and resources, such as gaps in policy and regulatory frameworks, access to financing, competition with arable crops, certification, and environment and sustainability issues. Emphasis was placed on the need for research in an African context to fill knowledge gaps in areas such as production of bioenergy, food and fuel trade-offs, and inventories of biofuels and their sustainability criteria.

Needs were identified to establish centres of excellence of bioenergy; to share experiences and lessons learned; to study crop suitability, agricultural productivity and yields based on a regional approach; all while attending to concerns around infrastructure, trade, and land availability. Some of the initiatives presented in debates on "creating knowledge networks" include the Pan-African Cassava Initiative (PACI), the African Biofuels Centre (ABC), and the Inter-regional Bioenergy Network.

Brazil used the opportunity to share its bioethanol experiences and showcase the drivers and supporting policy for its recent biodiesel programme. This programme is of special relevance because it is driven by the need to provide energy access to rural areas and address wealth inequality in Brazil, while at the same time ensuring social benefits to the rural farmers—goals similar to those in many African countries.

A 10-year action plan was initiated—The Addis Ababa Declaration on Sustainable Biofuels Development in Africa—drawing on recommendations agreed at the seminar. Its approach is eco-regional to the development of bioenergy, covering cross-cutting programme areas with an immediate focus on resource assessments, establishing knowledge networks and exploring options in existing agro-industries, all while providing output indicators to monitor progress on priority areas.

A second conference is planned for 2009 to follow-up on the successes and highlights of the first event. This is one of many first steps to making the African biofuels industry a reality. Now the real work begins with tackling the socio-economic and environmental issues to guarantee the sustainable development and success of biofuels in Africa. ■

For more information, see http://www.iisd.ca/africa/biofuels/

Access to clean energy for cooking in Ethiopia: impacts and potential of the Gaia Association ethanol-stove programme

by Fiona Lambe, Gaia Association/Stokes Consulting Group, Ethiopia

The overwhelming dependence of the household sector on traditional fuels (biomass) and kerosene for cooking is having a hugely negative impact on health, the environment, and the economy in Ethiopia and there is an urgent need for affordable alternatives.

Greenhouse gas emissions and deforestation associated with harvesting biomass for cooking is contributing to climate change and environmental degradation. Moreover, indoor air pollution from the burning of traditional fuels indoors causes serious health problems for those exposed—in most cases, women and children. Ethiopian families cook using these fuels because they are left without alternatives. Gaia Association, an Ethiopian NGO, and its partners are working to increase access to ethanol-fuelled cooking stoves for households at all income levels. Take-up of this alternative clean cooking technology has been shown to address the health, environmental and socioeconomic problems associated with heavy reliance on traditional cooking fuels.

The need for alternatives

Because of the stifling dependency on imported fuels, and a shortage of fuelwood, it is no exaggeration to say that Ethiopia is currently experiencing a serious energy crisis.

More than 85% of Ethiopian households are currently without access to modern, clean and efficient fuels for their household cooking needs. Instead they rely on traditional, inefficient stoves and unsustainably harvested biomass, and in urban areas on increasingly unaffordable kerosene. As well as producing harmful pollutants, the burning of such fuels also emits greenhouse gases (GHGs), thus contributing to global warming and climate change.

Photo: Fiona Lambe

Woman using a CleanCook stove in Addis Ababa

It is now widely accepted that exposure to indoor air pollution (IAP) from biomass fuels increases the risk of acute lower respiratory infections in children and chronic obstructive pulmonary disease in adults. Indoor burning of kerosene produces dangerously high levels of carbon monoxide, benzene and other carcinogens. It is estimated that IAP from solid fuel combustion is responsible for approximately 56,700 annual deaths in Ethiopia and accounts for 4.9% of the national burden of disease.[1] Women are at greatest risk because they do most of the cooking. Their babies, who are often carried on women's backs, also become victims.

Promoting locally produced ethanol

Since 2004 the Gaia Association has promoted ethanol and ethanol fuelled cooking stoves as an alternative to traditional cooking technology. The Gaia Association promote a stove known as the "CleanCook" (CC) stove, a modified version of the Origo stove made by the Swedish company Dometic AB. An extensive pilot test in Addis Ababa demonstrated the safety, efficiency and user-friendliness of the stove, as well as the participating household's willingness to switch to ethanol for all of their cooking needs.

The stoves are currently imported from Europe, but the Gaia Association has identified a local partner, Makobu Enterprises, to lead the commercialization and local manufacture of the stoves. A business plan sponsored by the UNDP's Growing Sustainable Business Program was recently drafted as a guide for this process. Funding for the business scale-up is supported by the United States Environmental Protection Agency (USEPA). It is estimated that local manufacture and distribution of the stoves will begin in 2008.

Ethiopia currently produces approximately 12 million litres of ethanol annually from sugar cane, which is set to increase to approximately 128 million litres by 2012. At present there is no domestic market for this ethanol, but the government has recently indicated its intention to prioritise developing both the transport and household ethanol markets. With the government's removal of subsidies, the price of kerosene has risen from 0.63 birr (0.07 USD) in 1990 to the current 2007 price of 4.15 birr (0.48 USD), making it increasingly unaffordable for the average household. Ethiopia is expected to spend approximately 1.2 billion USD on petroleum imports in 2007–08). Switching to locally produced biofuels such as ethanol could save this valuable foreign exchange.

An environmentally sustainable alternative

Because the CC stoves are clean burning, their large scale commercialisation will displace carbon and GHG emissions produced by traditional household fuels that are carbon-rich and burn inefficiently in poorly designed or makeshift stoves.

An ethanol stove makes significant cuts in GHG emissions—approximately 3 tonnes or more of CO_2-E per year less than wood and charcoal stoves if credit is given for biomass retained, and one tonne per year where ethanol completely displaces wood-use (if credit is factored in for the avoidance of gases other than

Table 1: Emission reduction potential of CleanCook stove and sales of certified emission reductions (CERs)

	2007/8	2008/9	2009/10	2010/11	2011/12	2016/17
Cumulative Stove sales	2,000	7,000	17,000	32,000	52,000	177,000
Emission Reduction, tonnes of CO_2E per stove	0.86					
Emission Reduction, tonnes of CO_2E per year	1,720	6,020	14,620	27,520	44,720	152,220
CERs value, USD per tonne	6.50					
CERs sales, USD per year	11,180	39,130	95,030	178,880	290,680	989,430

To evaluate the aggregate global warming potential (GWP) of emissions, the GWP of pollutant provided by IPCC was applied and converted to annual CO_2 equivalent.

CO_2. Savings in GHG emissions compared to kerosene stoves is conservatively estimated at 0.62 tonnes per year per stove (see Table 1).

The production of ethanol from sugar cane is environmentally sustainable, with an energy balance ratio of approximately 1:8.[2] Moreover, it makes use of an otherwise underutilized product, molasses, which is often dumped in rivers.

Increasing access to clean household energy

Currently, at the national level, little consideration is given to improving access to alternative cooking fuels at the household level. This is the first Ethiopia household energy project to promote ethanol as an alternative to existing traditional fuels and stoves. Much of the work of the Gaia Association is focused on increasing household access at every income level to improve clean cooking technology.

The Gaia Association is partnering with the Good Shepherd Sisters Centre, a community-based NGO in Ethiopia working to support low-income households that are headed by women. Together they have designed a project to provide ethanol stoves and fuel supply to 700 households located in Kirkos Sub-City in Addis Ababa. The project will establish a women's cooperative to sell ethanol CC stoves and fuel to local households. At the outset, the cooperative will be provided with the stoves, a six month fuel supply, and a storage and distribution centre. The cooperative will then sell the stoves to selected homes at the equivalent of the price of a kerosene wick stove (the currently favoured cooking appliance). All subsequent ethanol fuel will be purchased from the cooperative.

Ethanol is priced at 0.28 USD per litre. To ensure a profit, the cooperative will add a small mark-up on each litre of fuel sold, but still keep the price of ethanol well below that of kerosene. As kerosene is priced at 0.48 USD per litre, participants will be saving income as well as improving air quality in their homes by switching to ethanol.

The Gaia Association is also working with the Addis Ababa City Housing Authority and Municipal Environmental Protection Agency to introduce CC stoves to newly built condominium developments. The City Government is rapidly expanding the construction of these housing developments for low and middle income households, and energy alternatives for them are urgently needed.

With the assistance of USEPA, Gaia Association and Makobu Enterprises will launch a project whereby CC stoves will be installed in 2,000 of these apartments. Sale and distribution of ethanol will be managed by the condominium associations at each development. Replacement of kerosene and charcoal stoves will have a positive impact on the environment, reducing both IAP and GHG emissions. The stoves and users will be studied to audit the amount of avoided emissions for potential future carbon financing.

In Ethiopia, the United Nations High Commission for Refugees (UNHCR) has already embraced the CC stove as a tool for humanitarian relief in Kebribeyah refugee camp in eastern Ethiopia. There, the stove has had a huge and positive impact on the lives of refugees who previously had relied exclusively on gathered fuelwood for their cooking needs. The search for fuelwood is fraught with danger as women and girls risk attack and rape every time they leave the camp. Moreover, the harvesting of fuelwood has had a devastating impact on the natural environment and triggered violent conflict between the settled and refugee communities competing for these scarce resources. These 850 stoves have displaced fuelwood by 95 to 100% and reduced GHG emissions by 850 tonnes, based upon the displacement of gases other than CO_2 alone.

Convincing key stakeholders of the value and potential of ethanol to address the domestic energy crisis has not been without challenges. As with any new technology, there are risks and uncertainties which can only be overcome through demonstration and thorough testing. In a relatively short period of time, Gaia Association has succeeded in convincing both the public and private sectors of the need for this technology.

With several projects designed to increase household access to clean energy currently in the pipeline, the Gaia team is leading the way to a biofuel driven household energy sector in Ethiopia.

References

[1] WHO, 2007. *Fuel for Life: Household Energy and Health*. World Health Organization 2006. ISBN 92 4 156316 8.

[2] Macedo, I. C. (1998). Greenhouse gas emissions and energy balances in bio-ethanol production and utilization in Brazil (1996). *Biomass and Bioenergy*, Volume 14, no. 1, March 1998. ■

For more information, contact fionalambe@gmail.com

Sweden looks at bioenergy from agriculture

Review of a new government report on the future for bioenergy

By Max Åhman, Lund University, Sweden

Sweden has a deserved reputation of being a forerunner in the field of biomass for energy use. Modern biomass accounts for 112 TWh of the total 630 TWh (17%) of primary energy supplied to the Swedish energy system. This is very high for an industrialised country.

Photo: Fiona Zuzarte

Ethanol plant in Norrköping, Sweden

In the wake of the oil crises, biomass use for energy in Sweden has grown from 40 terawatt hours (TWh) since 1973 to 112 TWh today. The major share of this biomass supply comes from the forest, including pulp residues (black liquor) internally used in the paper and pulp industry and wood residues used for heating. The last 15 years has seen a huge growth of biomass use in the heating sector, supported by the introduction of a CO_2 tax in the early 1990s that made it more profitable to use woody biomass for heating than oil and coal.

Oil dependence, mitigating climate change and fostering industrial competitiveness are some of the reasons for Sweden's interest in biomass. Sweden wants to take a leading role in the climate debate and has, among other things, pledged to make deeper cuts in CO_2 emissions than mandated by the "EU-umbrella" under the Kyoto Protocol. Sweden also sees a long-term strategic interest in developing technologies and industrial capacity around biomass supply and use.

However, the agricultural sector supplies only 1.5 TWh of biomass energy to the Swedish energy system. This biomass is in the form of wheat, rapeseed and some willow. In the early 1990s, Sweden had almost completely deregulated its agricultural sector (something very unique in an international context) creating a need for structural adjustment and expanding the production of energy crops. But this never took off as hoped, partly because Sweden joined the EU in 1995 and thus had to re-regulate the agricultural sector to conform to the EU's common agricultural policy (CAP).

In this context, a report was commissioned by the government aimed at investigating the role agriculture *could* play in the future Swedish energy system, and to shed some light on the role agriculture *should* play. The final report reflects its mix of input from academics, the farming community and from government agencies.

The role agriculture could play

To define the role agriculture *could* play, the report examined economic feasibility using a bottom-up approach, looking at different vegetation and climate zones in Sweden (traditionally divided into eight different zones) and their potential crops (willow, rapeseed, wheat, reed canary grass and hemp). Insights into what could be economically feasible for the farmer are complemented by different scenarios exploring the influence of future crop and energy prices. A near-term potential of 2–3 TWh is estimated, with rapid expansion to a potential 20–30 TWh by the year 2020. This shift in production will have a major effect on the farming community but only contribute a little to the overall goal of reducing fossil-fuel use in accordance with climate change requirements. Climate change and oil dependence will have to be solved by other sectors, the report states.

Feedstocks and markets

For Swedish farmers, the profitable crops for energy production are deemed to be willow, rapeseed and wheat. Agricultural waste streams can also be utilised for biogas. In the long-term it is predicted that willow will produce cellulosic biomass for both heating and electricity in combined heat and power production (CHP), and wheat will be used for ethanol production and heating. Rapeseed is profitable for rapeseed methyl ester production, although its contribution will be restricted for conservation reasons. The production of biogas is also profitable but limited due to scale of waste streams.

The key assumption in the scenarios is that the international demand for bioenergy will grow, as will the prices for biomass. Willow for CHP and power production has the largest growth potential. However, this requires available "heat markets" such as municipal district heating systems. In the last four years in Sweden, due to support schemes such as green electricity certificates, biomass-fuelled CHP-use and technology has expanded rapidly.

In Sweden, approximately 2.3 TWh of ethanol is used in the transport sector, of which 75% is imported from Brazil.

Today, ethanol from Swedish wheat costs around twice that of imported Brazilian sugar-cane ethanol and is only competitive thanks to an import tax. If the global demand for ethanol grows and surpasses the supply of low-cost sugar-cane ethanol, the report predicts that wheat for ethanol production could be profitable for Swedish farmers in the future.

Environmental effects of energy production

Apart from the positive environmental effects of displacing fossil energy, expansion of biomass production could have negative effects at a local and regional level. Concerns have been raised over monocultures and large-scale industrial production methods. For the most part, the environmental effects of agriculture for energy are less compared to production of food because it is less intensive and thus needs less input.

Biodiversity could, however, be negatively affected if old pasture land is planted with monocultures. These environmental effects are very site specific and can be managed if carefully handled.

The role agriculture should play

Agriculture policies are usually influenced by many objectives: food security, the potential of an energy source, a traditionally strong and well organised farming community, and protection of traditional landscapes and cultural heritage. So it is wise to look not only at the economic potential (the *could*), but also what role agriculture as an energy producer plays in the mix of other policy objectives (the *should*). The market should guide agricultural development as an energy producer, which fits well with Sweden's long-standing vision that the agricultural sector should be deregulated. However, government support is still required if, for example, Sweden is to take a lead in the global climate debate, establish and support a market for ethanol, and ensure technological innovation and business opportunities are not missed.

Because it looks at the agricultural sector in isolation, and its balance of views is weighted towards the sector, the report is not clear on where to draw the line between what is in Sweden's strategic interest and what is merely government support to the agricultural sector. Also, the report finds no moral problem with producing energy instead of food in Sweden. The moral issue is more about protecting the land for future food production. The report recommends that productive agricultural land should be given a special "national interest" status, conferring some sort of protection against competing interests like road building, land for housing, and tree plantation.

30 TWh of energy from agriculture

The crops assessed as having the best potential have different barriers, and thus support schemes. Wheat for ethanol production and rapeseed for RME production can both be profitable on their own account, assuming that current policies to introduce biofuels in the transport sector remain. Neither of these is currently competitive with fossil fuels despite a high CO_2 tax in Sweden.

The market for willow is too small to sustain competing companies and the lack of competition in provision of services for growing willow makes the overall cost unnecessarily high for the farmer. The report states that expansion of willow production from 15,000 to at least 50,000 hectares will be enough to harbour several actors and thus create a well-functioning market. To encourage farmers, it is suggested a "contract premium" of 2,000 SEK (295 USD) per hectare be paid for new willow plantations to a 50,000 hectares limit to tip the balance. The barrier of high initial investment for biogas plants can be overcome with a time-limited support scheme of up to 30% of the building cost to kick-start the market and drive down investments costs for future plants.

The role agriculture will play

The suggestions made in the report are endorsed by the government and based on involving many key actors within relevant agricultural communities and the state. Support is expected for expansion of willow plantations for use in CHP plants and the biogas market. The new government has recently pledged to remove the import tariff on ethanol for blending, making the competition for the Swedish ethanol market tougher.

Another unforeseen development is the price doubling of agricultural products for food in the last year. If this price is sustained, none of the projections and calculations made in this report will hold, as biomass production will find it hard to compete on land that can be used for agricultural needs as well. ■

For more information contact
max.ahman@miljo.lth.se

Photo: imagebank/Håkan Sandbring

Rapeseed farm in Skåne, Sweden

Towards a new global agreement on climate change

Richard J.T. Klein and Mikael Román, SEI

The thirteenth Conference of the Parties to the UNFCCC (which also serves as the third Meeting of the Parties to the Kyoto Protocol) will take place on the Indonesian island of Bali in December 2007. Here countries are expected formally to begin negotiations on an international climate policy regime to be implemented from 2013 onwards. Preparatory discussions were concluded in Vienna, Austria, in August 2007. A result of these discussions was that future climate policy needs to comprise of four components: mitigation, adaptation, technology and funding.

Photo: John Soussan

Floods in Bangladesh

In December 1997 in the Japanese city of Kyoto, governments for the first time agreed on legally binding targets to limit the emissions of greenhouse gases. The agreement, known as the Kyoto Protocol, was a first step towards meeting the ultimate objective of the United Nations Framework Convention on Climate Change (UNFCCC), which was agreed to five years earlier at the UN Conference on Environment and Development in Rio de Janeiro, Brazil. This ultimate objective, as stated in Article 2 of the UNFCCC, is:

"to achieve ... stabilisation of greenhouse gas concentrations in the atmosphere at a level that would prevent dangerous anthropogenic interference with the climate system ... within a time-frame sufficient to allow ecosystems to adapt naturally to climate change, to ensure that food production is not threatened and to enable economic development to proceed in a sustainable manner."

Under the Kyoto Protocol industrialized countries collectively commit to reduce overall emissions of six greenhouse gases by 5.2% compared to the year 1990, calculated as an average over the five-year period of 2008–2012. National targets range from 8% reductions for the European Union (EU) and some other countries to 7% for the US, 6% for Japan, 0% for Russia, and permitted increases of 8% for Australia and 10% for Iceland.

The Kyoto Protocol entered into force 90 days after the date on which at least 55 Parties to the UNFCCC had ratified the Kyoto Protocol and at least 55% of the industrialised world's total CO_2 emissions in 1990 would be subject to the protocol. Of the two conditions, the "55 Parties" clause was reached on 23 May 2002 when Iceland ratified. The ratification by Russia on 18 November 2004 satisfied the "55%" clause and brought the treaty into force, effective 16 February 2005. As of November 2007 two important greenhouse-gas emitters that hadn't ratified the Kyoto Protocol (even though they signed up to it in Kyoto) were the United States and Australia.

With the first commitment period of the Kyoto Protocol ending in 2012, a range of proposals have been prepared that lay out a post-2012 international climate policy regime. What these proposals tend to have in common are emission-reduction targets that are more ambitious than those of the Kyoto Protocol, and the inclusion of emerging greenhouse-gas emitters, such as China, India and Brazil. The higher ambition is in response to a large body of research that shows that climate change is already happening, and that more stringent emission reductions are required to avoid dangerous climate change.

Mitigation

The recent Fourth Assessment Report of the Intergovernmental Panel on Climate Change (IPCC) concludes that the world could face a global mean rise in temperature of 1.1–6.4°C by 2100 (compared to 1980–1999), with greater warming taking place over land and at high latitudes. The higher the temperature increase, the greater the consequences on natural systems and societies. Studies published since the release of the IPCC Fourth Assessment Report suggest that the climate is changing even more rapidly than was projected only a few years ago.

These scientific findings create a growing sense of urgency for action among policymakers. The EU considers a global mean temperature increase of more than 2°C to be dangerous (compare with the aforementioned objective of the UNFCCC). It is therefore calling for large emission reductions: its

Photo: IISD

UNFCCC Workshop on Adaptation Planning and Practices under NWP, FAO, Italy, 2007

ambition is to achieve a reduction of at least 20% in CO_2 emissions from all primary energy sources by 2020 (compared to 1990 levels), while pushing for an international agreement to succeed the Kyoto Protocol aimed at achieving a 30% cut by all developed nations by 2020. However, up to December 2007 the United States and Australia have rejected mandatory caps on emissions.

The EU's position is shared by most developing countries. They have made only a small contribution to global greenhouse-gas emissions to date, and the use of fossil fuels will remain important in their development pathways. On the other hand, current emissions from China, India, Brazil and several other emerging economies have now reached a level where it becomes hard to imagine a global agreement without their explicit involvement. In addition, the release of CO_2 from deforestation can be addressed effectively only by involving countries such as Brazil and Indonesia.

In spite of the apparent deadlock, important changes seem to be under way. For example, in the United States the issue of climate change is gaining attention, at least at the state and regional levels. Along with an increasing awareness among industry actors and the general public, this opens up perspectives for national involvement once a new administration takes office in 2009. In China the political leadership are taking notice of the environmental implications of rapid economic growth. A debate is emerging, with several proposals being considered. Brazil has declared the need for more ambitious goals, along with universal compliance, in a post-2012 agreement. Finally, growing awareness and involvement of the private sector and civil society show that the societal context for climate policy is changing favourably.

Adaptation

Whereas mitigation has always been central to the negotiations, adaptation has only recently become more than a marginal issue. With climate change being observed and bound to continue, adaptation is a necessity, especially in developing countries where large parts of the population live in disaster-prone areas or rely directly on natural resources for their livelihoods. Irrespective of any agreement on mitigation, the world is already committed to a further warming of almost 1°C on account of past emissions, due to the inertia of the climate system. Millions of people will experience this warming through impacts on water availability and food security, an increased likelihood of floods and cyclones, the spread of infectious diseases such as dengue, malaria and cholera, and loss of lives and livelihoods. The hardest hit from these changes will be people in the least developed countries, primarily those already living in marginal and exposed areas.

Mitigation concerns the protection of a global public good, for which it is irrelevant where on the globe reductions in greenhouse-gas emissions take place. Adaptation is a more localised activity, which does not lend itself to setting global targets. Negotiations on adaptation therefore are quite different from those on mitigation. They concentrate on two ways in which adaptation efforts can be promoted: the provision of relevant data, information and knowledge, and the provision of financial support and technology for adaptation in developing countries. At the same time institutional issues are being discussed, including the question of how to link adaptation with development assistance.

The Nairobi Work Programme on impacts, vulnerability and adaptation to climate change, agreed at the twelfth Conference of the Parties in Nairobi, Kenya, in 2006 is a five-year programme to assist countries to improve their understanding of their adaptation needs and to make informed decisions on adaptation actions. It is structured around nine themes, each of which cover a particular dimension of adaptive capacity (e.g., data and observations, climate-related risks and extreme events, socio-economic information and technologies for adaptation). The programme is expected to result in, among other things, enhanced adaptive capacity at international, regional, national, sectoral and local levels; enhanced development, dissemination and use of knowledge from practical adaptation activities; and enhanced cooperation among Parties, relevant organisations, businesses, civil society and decision makers.

Technology

Many negotiators see the development and transfer of new technologies as crucial for meeting ambitious mitigation targets. The IPCC Fourth Assessment Report has found that with technologies that are currently available or expected to be commercialised within the coming decades, it would be possible to stabilize atmospheric greenhouse-gas concentrations at a level that remains close to what is needed to stay below the EU temperature target of 2°C. This assumes that appropriate and effective incentives are in place for the development, acquisition, deployment and diffusion of technologies, and for addressing related barriers.

The UNFCCC already commits developed countries to engage in technol-

Photo: IISD

Riverbank protection work along the Bramaputra River

ogy transfer with developing countries (Article 4.5):

"The developed country Parties and other developed Parties included in Annex II shall take all practicable steps to promote, facilitate and finance, as appropriate, the transfer of, or access to, environmentally sound technologies and know-how to other Parties, particularly to developing countries to enable them to implement the provisions of the Convention."

If a post-2012 agreement were to include emission-reduction targets for developing countries, this article (as well as Article 10c of the Kyoto Protocol) is likely to gain in importance. China has already made it clear that commitment to technology transfer is a precondition for further discussion. It also insists on a more powerful body on technology under the UNFCCC than the current Expert Group on Technology Transfer, the mandate of which ends in Bali. The least developed countries would like to see a stronger emphasis in the negotiations on the transfer of technologies for adaptation.

A potentially promising mitigation technology is carbon capture and storage (CCS), whereby CO_2 emitted from, for example, coal-fired power plants, is captured and stored in deep geological formations or the deep ocean. While technology for capturing CO_2 is already commercially available, storage of CO_2 is a relatively untried concept. The potential of CCS is large, yet there are concerns about the possibility of stored CO_2 leaking out into the atmosphere, which would compromise its mitigative effect. In addition, as a typical "end-of-pipe" measure, the CCS could also work against changes in people's lifestyle and behaviour patterns that would result in lower emissions or greenhouse gases.

Funding

Successful progress on the above three issues will depend on the availability of funding. In a recent study the UNFCCC Secretariat has assessed the financial requirements for mitigation and adaptation. It concludes that the additional estimated amount of investment and financial flows needed in 2030 to address climate change is large compared with the funding currently available, but small in relation to estimated global gross domestic product (GDP) (0.3–0.5%) and global investment (1.1–1.7%) in 2030. As the Stern Review pointed out, the costs of doing nothing would be substantially larger (up to 5% of global GDP).

The UNFCCC Secretariat also concludes that the carbon market, which is already playing an important role in shifting private investment flows, would have to be significantly expanded to address needs for additional investment and financial flows for mitigation. However, additional external funding for mitigation and adaptation will be needed in developing countries. Potential sources for external funding include official development assistance, private-sector investment, the financial mechanism of the UNFCCC and other sources.

An important agenda item in Bali will be funding for adaptation in developing countries. The UNFCCC Secretariat has estimated that 28–67 billion USD in support will be needed by 2030. Article 12.8 of the Kyoto Protocol established an Adaptation Fund to assist developing country that are particularly vulnerable to the adverse effects of climate change to meet the costs of adaptation. It receives a 2% share of proceeds from project activities under the Clean Development Mechanism (CDM) and can also receive funds from other sources. The actual amount of money that will be available from the Adaptation Fund is uncertain as it depends on the extent of use of the CDM and on the price of carbon. According to the World Bank, it is likely to total 100–500 million USD by 2012; a fraction of what would be needed.

Conclusions

The Conference of the Parties to the UNFCCC in Bali will be a crucial one. Negotiations on a post-2012 climate regime should begin in earnest, and important decisions will have to be made on technology transfer and adaptation funding. It is impossible to speculate on the outcome, but it is clear that the negotiators are more aware than ever of the urgent need to make progress. The IPCC has shown that there are possibilities to act; the Stern Review and others have shown the economic imperative for doing so.

Given the complexity of the issue, there are ample opportunities for countries to hold each other hostage in the negotiations. On the other hand, following the UN Secretary-General's recent high-level event on climate change in New York and the awarding of the Nobel Peace Prize to the IPCC and Al Gore, the prospects for achieving a breakthrough have never been brighter. ■

For more information, contact richard.klein@sei.se or mikael.roman@sei.se

Announcements

Food, feed, fuels

SEI is joining with Dutch NGO **Hivos** on a project to survey knowledge on the influence of changing land-use patterns on food, feed and fuel availability for marginalised populations in developing countries. If you have concerns about the effects of changing diets or the impact of biofuels on food prices and food security, we would be very interested in hearing from you. You will find a short survey online at **http://www.sei.se/hivos**. Please take a few minutes to fill it out if you are interested in this topic. We thank you in advance for your time and interest.

For more information, please contact
Roel Hammerschlag
roel@sei-us.org
tel. +1 206 547-4000 ext. 3
Skype: r.hammerschlag
www.sei-us.org

New book on diplomacy for sustainable development

Bo Kjellén

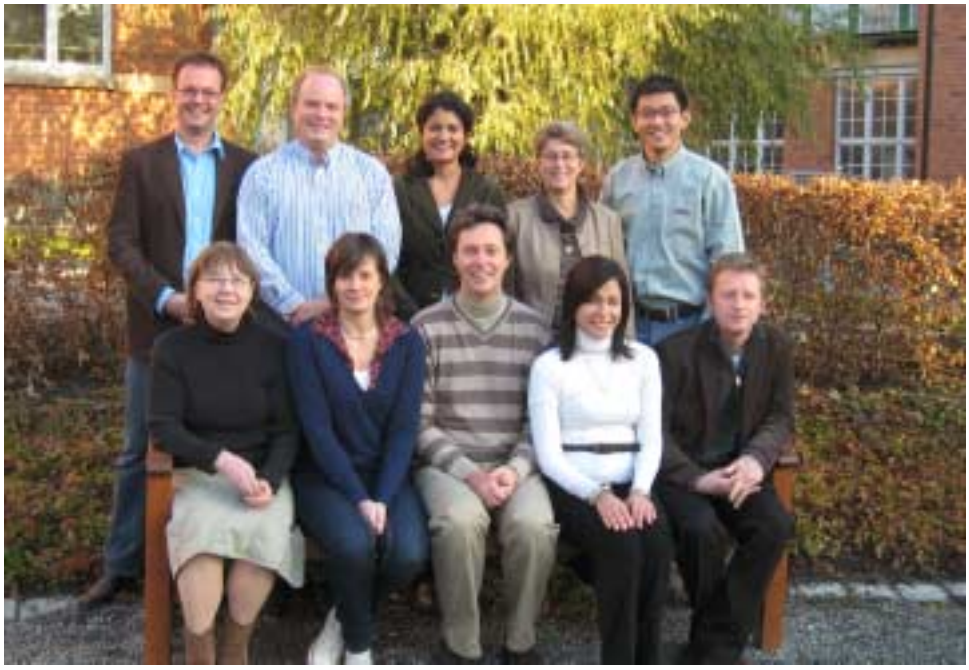
Starting with the optimistic conclusion of Rio de Janeiro Climate Convention in 1992, Swedish former ambassador and chief climate negotiator Bo Kjellén takes the reader on a personal journey behind the headlines of global environmental politics. In his book *A New Diplomacy for Sustainable Development. The Challenge of Global Change,* published by Routledge in the SEI Global Environment and Development Series, he paints a picture of how perceptions of the global environment have changed and its relationship to globalisation, national political realities, and changes in norms and values. Kjellén discusses a range of topics in current climate politics: the North–South divide, the uneasy friendship between Europe and the United States, and how local and national climate action can facilitate international agreements.

Important changes to the RED newsletter

As RED celebrates its twentieth year, it is also undergoing changes. There is no longer dedicated funding for RED, and we would like to hear from you, the readers, to know if you would like to continue to receive the newsletter. Your input on the format of any future newsletter would also be appreciated. It would be very useful for us, and important for the future of RED, if you would respond to the questionnaire included in this edition, and update your profile and contact information. You can also take the survey online at www.sei.se/red-survey.

SEI

Renewable Energy for Development 1988-2007



Climate and Energy Group, Stockholm Centre

Top (from left to right): Richard J.T. Klein, Francis X. Johnson, Fiona Zuzarte, Annika Nilsson, Yong Chen.
Bottom: Solveig Nilsson, Christine Börjesson, Mikael Román, Maria Milagros Morales, Tom Gill (missing: Helena Forslund).