

## Exploring the Links Between Climate Change, Energy and Poverty

As part of the lead-up to COP-15 in Copenhagen, three new GNESD policy papers examine the complex relationship between climate change, energy and poverty. These short papers are the result of the work of three GNESD Member Centres—AFREPREN (Kenya), Bariloche Foundation (Argentina) and ENDA (Senegal)—each of which brings a different focus to this multifaceted issue.

AFREPREN's study, *Climate Change and Energy Security in East Africa*, identified inadequate planning for power sector crises as a major shortcoming on the part of regional governments. Planning for drought-induced reductions in hydropower generation was of particular concern. As the study points out, East Africa relies on hydropower for almost 80 per cent of its electricity. Despite warnings and predictions that in the future regional rainfall pattern may vary due to climate change, countries are still considering investing heavily in hydropower. A combination of increased drought and shorter rainy seasons is already causing frequent disruptions in power sector operation, but so far, the only governmental response seems to be a turn to emergency thermal electricity. This is often excessively costly and can have crippling effects on countries' economies.

Given the challenges facing the power sector in East Africa, there is a need to adopt more robust, resilient and well thought out plans for dealing with drought-induced power crises. The study notes three essential elements for future planning:

diversifying generating sources—using a wider mix of energy sources; promoting proven renewable energy technologies for electricity generation; and setting targets for renewables in the energy mix.

The main thrust of the Bariloche Foundation's study—*Energy, Poverty and Climate Change in Latin America and the Caribbean*— is to show that despite the complexity of the

relationship between energy-poverty and climate change, the issues are perfectly manageable. The study argues that by adopting an integrated approach and identifying new links between energy, poverty and climate change it will be possible to tackle the situation in a comprehensive way.

The paper concludes that a regional approach would be most effective for analysing potential crosscutting issues among countries. For Latin America and the Caribbean, the study determined that the most urgent needs are:

Identification of criteria or options that, while embracing poverty alleviation and vulnerability reduction, also contribute to mitigation.

Identification of potential actions to reduce vulnerability of the energy sector to direct or indirect impacts of climate change, with a focus on the poor. Review of criteria to satisfy multiple objectives such as GHG mitigation, adaptation, energy security, access to energy, equity, competitiveness, etc.

In its study, *Energy in the National Adaptation Programmes of Action (NAPAs) in Africa*, ENDA found that energy barely figures in the projects and adaptation solutions developed in NAPAs, the national programmes introduced by the UNFCCC to help developing countries address their urgent climate change adaptation needs.

ENDA's analysis of 455 adaptation projects planned by 41 developing countries reveals that, in spite of the fact that that energy is both indispensable for implementation of NAPA projects and is a sector that is vulnerable to climate change in its own right, less than 4 per cent of the 455 projects were energy related.

The study concludes that energy must become a mainstream element of vulnerability analysis if countries are to meet the dual challenge of implementing NAPAs as a matter of urgency, and ensuring sufficiently diverse and sustainable energy sources to underpin their future development.



## GNESD Bioenergy Study: Interim Findings

The first findings are available from GNESD's ongoing thematic study on how bioenergy can contribute to rural development and poverty alleviation. The study, which was launched in December 2008, is a departure from previous bioenergy analyses undertaken by UN and other multilateral agencies, which mostly address trade issues and tend to focus on liquid biofuels. GNESD's report examines all forms of bioenergy—solid, gas and liquid—to see what role each can play in enhancing the lives of poor people in rural areas and fulfilling their development goals.

Ten GNESD Centres of Excellence are involved in the study, which is reviewing some 20 developing countries. The inception phase included a detailed analysis of the potentials within all three types of bioenergy. The centres then considered a wide range of issues regarding bioenergy use—including sustainability, financing, job creation, food security and whether large plantations are compatible with small farmer programs—and identified the main barriers to implementing sustainable bioenergy in each country.

The study's main preliminary findings show that though most countries still rely heavily on traditional biomass (unsustainably harvested wood and charcoal used for heating and cooking), there is both high potential and interest in modern forms of bioenergy, as a sustainable alternative to fossil fuel for transport, as well as a means of decentralized energy production. Many countries already have national programs in place to promote the production and use of bioenergy, and most of these are geared towards rural development goals and reducing poverty. The study stressed the importance of developing local bioenergy production activities to support these programs.

The range of potential bioenergy options is wide and extremely varied. In West Africa, for example, there is intense interest in the jatropha plant, which requires little water and can grow on low-quality land, for producing biodiesel. In other countries, like Kenya and Thailand, the most promising bioenergy option was the use of agricultural waste, which doesn't require new plantations or disrupt existing farming practices and food production.



Regarding the delicate question of cultivating feedstocks for bioenergy production, the centres stressed the importance of identifying appropriate areas for cultivation that do not jeopardize water, land, or food security.

While the potential for bioenergy in developing countries is considerable, there are significant barriers to overcome: lack of policy and regulatory frameworks, infrastructure and trained local workforce. The first step, according to the centres, is establishing frameworks so that a bioenergy industry can take root and create instruments to promote new energy options. Brazil, Malawi and Columbia, for example, established a mandatory biofuel blend that created a captive market. In Thailand and China, the creation of renewable portfolio standards, feed-in tariff incentives, RE purchase obligations and competitive biddings helped insure the presence of biomass energy in the electricity market.

R&D for biofuel technology and electricity production presents an excellent opportunity for South-South cooperation, as shown in Latin American countries with bioethanol and biodiesel, and in India with small-scale gasifiers. In this regard, the study notes that international foster agencies can play an important role by helping countries build infrastructure, enhance capacity and facilitate technology transfer through South-South cooperation.

# Developing Countries and Energy Security

In September 2009, GNESD concluded an 18-month study on energy security in eight developing countries that explored issues regarding energy accessibility, financing and dependency on traditional biomass for cooking fuel. The study, which examined energy security issues at both a national and household level, covered Argentina, Brazil, India, Kenya, Senegal, South Africa, Thailand and Tunisia. While there is not yet a universal definition of "energy security" (the study found substantial differences between OECD and developing countries definitions), there is one common concern in developing countries: access to clean and modern energy at affordable prices.

The study identified several financial barriers to energy access, including the increasing percentage of GDP spent on energy imports, compared to export earnings. For example, Kenya and Senegal spend more than half of their export earnings on importing energy, while India spends around 30%. Countries confronting a high energy import bill tend to have limited access to modern energy sources and are highly dependant on biomass for cooking fuel. In Senegal, India and Kenya, the share of biomass in household energy consumption exceeds 70%.

Rising international petroleum prices have also presented a serious challenge to low-income countries, and there is evidence that many households are moving down the energy ladder. For example, in the 1970s Senegal introduced subsidies promoting liquefied petroleum gas to avoid overuse of forest biomass. The subsidies were eventually withdrawn due to rising oil prices, and many poor households turned back to biomass as an energy source.

Low-income households also spend a significantly higher portion of their total expenditures on energy (about 18% in Argentina, Thailand and Senegal, and over 20% in Kenya) than their high-income counterparts, and are consequently more vulnerable to energy price increases than households in other income groups.

The study also underscored the importance of having a diversified energy sector. In general, developing countries have a less diversified energy sector than OECD countries, and among the countries studied there was a highly variable level of diversification. Low-income countries with less indigenous resources, such as Kenya and Senegal, are more economically vulnerable, whereas more developed countries, such as Argentina, Brazil and Thailand, are more diversified and thus less vulnerable to economic ups and downs.

Poor quality energy supply and service interruptions, which plague many developing countries, can be traced to overreliance on a single resource (e.g., hydro in Kenya),

and lack of investment in infrastructure needed to meet increasing demand. Some examples of the latter include inadequate installed capacity in India, insufficient oil refining and storage facilities in Senegal, and low power generation reserve capacity and inadequate electricity transmission and distribution facilities in South Africa. Energy security for households in these countries is threatened by insufficient access in many areas, and by recurrent service interruptions in others.



The study also highlighted the need for a more comprehensive approach to energy security strategies in the transport sector. Road-based transport accounts for more than 50% of the total oil consumption in several countries (Brazil and South Africa). National energy strategies, which usually focus on energy resources and technology solutions, must also be geared towards developing a sustainable and energy-efficient transport sector.

The study recommended several measures designed to address energy insecurity, including a dedicated ministry for new and renewable energy development in India, and regional energy development initiatives in Greater Mekong Sub Region, South Asia and in South America. Key strategies for diversifying resource bases and reducing dependency on imports focus on the promotion of renewable energy and energy efficiency, such as the Energy Conservation Fund in Thailand, proactive and consistent biofuel programs in Brazil, and fiscal incentives in several developing countries.

## Upcoming Events

The GNESD Expert meeting + Annual Assembly 2009

'Low Carbon – Resilient Development – Improving access to clean and efficient energy services'  
Tuesday, Dec. 15: 9:00 – 4:00 pm  
Venue: European Environment Agency, Kongens Nytorv 6, Copenhagen K

COP 15 Side Event  
GNESD – Helio International Energy Access & Poverty Alleviation  
Reducing vulnerabilities and increasing resilience –How can we ensure access to adequate energy services in the context of climate change?  
Wednesday, Dec. 16: 9:00 – 10:30am  
Venue: COP 15 - Room: Niels Bohr



## Regional Workshops Held

GNESD has organized four regional workshops to present the findings of the Energy Access for the Urban and Peri-Urban Poor thematic study, inviting regional experts to come and share their experiences on the same topic

The first workshop, organized by the Energy Research Centre, was held in Cape Town, South Africa. The latest studies on energy access for the poor and energy security were presented and the results were discussed in relation to technology transfer, capacity building and achieving the MDGs. The availability of information about energy needs, best practices, technologies and funding possibilities was seen as key to all three of these issues. The workshop brought together energy-sector stakeholders from 10 countries in East and Southern Africa, along with international energy experts from Argentina, Brazil, Denmark, India, Senegal and Thailand.

The Cape Town workshop, along with a similar conference in Senegal, was also part of EUEI–UNEP Capacity Enhancement and Mobilization Action for Energy in Africa (CEMA), whose mission is to mobilize and enhance capacity in the sub-regions so that countries can take advantage of support facilities—especially the new Africa–EU Energy Partnership. The workshop for Western and Northern Africa was organized by ENDA and was held in Dakar. The workshop had participants and experts from 18 countries of the region.

GNESD's AIT Centre hosted the Asian workshop in Jakarta, Indonesia. Senior policy makers, practitioners, utility companies, NGOs and academicians from 9 Asian nations attended this workshop, as did representatives of several Asian governments.

Organized by Foundation Bariloche and CENBIO / Centro Clima jointly with ECLAC, UNDP and Club de Madrid, the workshop for the LAC region was held in Santiago, Chile. Participants from 15 LAC regions focused on the key role that energy access plays in achieving the MDGs and reducing poverty in LAC countries. Key challenges and policy proposals were presented during discussions that centered on the study's outcomes and the role of renewable energy in poverty alleviation.

The presentations made during the four workshops are available at GNESD website: [www.gnesd.org](http://www.gnesd.org)

# GNESD

## Secretariat:

The GNESD Secretariat is located at Risø National Laboratory (RNL) at DTU, Denmark, which is also the host of the UNEP RISØ Centre (URC).

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A dedicated web site for the GNESD is located at [www.gnesd.org](http://www.gnesd.org). This newsletter provides information on the activities of GNESD and the views expressed do not necessarily represent those of UNEP or Risø National Laboratory. For additional information or comments please contact the editor, Mette Annelie Rasmussen ([mette.annelie.rasmussen@risoe.dk](mailto:mette.annelie.rasmussen@risoe.dk)). GNESD is printed on 100% recycled, chlorine-free paper. Layout by Finn Hagen Madsen, [finn@studio8.dk](mailto:finn@studio8.dk).

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 The African Energy Policy Research Network/Foundation for Woodstove Dissemination (AFREPREN/FWD), Kenya.  
 The Energy Research Centre (ERC), South Africa.  
 Mediterranean Renewable Energy Centre (MEDREC), Tunisia.

### Europe:

AEA Technology, Future Energy Solutions (FES), UK.  
 KFA Forschungszentrum Jülich, Germany.  
 The Department of Energy and Environmental Policies (EPE), Production and International Integration Economics Laboratory (LEPII), Université Pierre Mendès, France.  
 The Energy Research Center of the Netherlands (ECN), The Netherlands.  
 The Fraunhofer Institute for Solar Energy Systems (ISE), Germany.  
 The International Institute for Industrial Environmental Economics (IIIEE) at Lund University, Sweden.  
 UNEP RISØ Centre (URC), Denmark.

### North and South America, The Pacific:

The Institute for Energy Economics at Fundación Bariloche (IDEE/FB), Argentina.  
 The National Renewable Energy Laboratory (NREL), USA. The Stockholm Environment Institute's Boston Center (SEI-B), USA.  
 The University of the South Pacific (USP), Fiji.  
 CentroClima at the Federal University of Rio de Janeiro and CENBIO at the University of São Paulo in conjunction, Brazil.

### Middle East and Asia:

Institute of Energy Economics (IEEJ), Japan.  
 The Asian Institute of Technology (AIT), Thailand.  
 The Energy and Resources Institute (TERI), India.  
 The Energy Research Group (ERG) at The American University of Beirut (AUB), Lebanon.  
 The Energy Research Institute (ERI) of the National Development and Reform Commission (NDRC), China.