



Master Environmental and Energy Management (MEEM)

2010/2011 programme

**The Twente Centre for Studies in Technology and
Sustainable Development (CSTM)**

Mini-Symposium Guide

Leeuwarden, 10 February 2011

UNIVERSITY OF TWENTE.

Programme

- 10:30 – 11:00 welcome; coffee/tea
- 11:00 – 12:15 **Session 1: Projects and tools in support of Energy policy formulation**
(3 presentations, 15 min for Q&A)
Mohamed Youba Sokona – LEAP (Long Range Energy Alternatives Planning System): A Tool for Sustainable Energy Analysis.
Shadrack Kiprono Kirui – Bioenergy and Climate Change at village level as input for policy formulation – Case study of Nyando District in Kenya
Pratikshya Pradhan – Gender and Energy Activities in Nepal
- 12:15 – 13:15 Lunch break
- 13:20 – 14:10 **Session 2: Energy policy**
(2 presentations, 10 min for Q&A)
Aldi Hutagalung– Indonesia Natural gas policy
Vicky Marin – Biofuels, human rights and entitlement in Colombia: a multilevel analysis of dynamics and processes of socio-environmental conflicts
- 14:10 – 14:30 Coffee/tea break
- 14:30 – 15:20 **Session 3: Cleaner Production**
(2 presentations, 10 min for Q&A)
Huong Thu Ta– CP4BP Sustainable products in Vietnam
Tawanda Collins Muzamwese – Resource Efficient and Cleaner Production (RECP) in Zimbabwe: case studies, challenges and opportunities for up-scaling

Session 1:

Projects and tools in support of energy policy formulation

LEAP (Long Range Energy Alternatives Planning System): A Tool for Sustainable Energy Analysis.

Mohamed Youba Sokona

The formulation of energy policies most often considers social, economic and recently, environmental drivers. Policy making in energy is increasingly gaining importance as issues of climate change and sustainability are brought to the fore. This requires strategic decision making to ensure the development of sound policies that respond to and meet the required needs in a region or a nation. Energy security as a whole has to be improved and this means that energy sources have to be diversified coupled with improving energy efficiency while at the same time promoting economic competitiveness. In all of this, the protection of the environment has to remain an issue of importance. It is for this purpose that the Long Range Energy Alternatives Planning System (LEAP) has been developed. LEAP is a user friendly integrated modeling tool that can be used to track energy consumption, production and resource extraction in all sectors of an economy. It can be used to account for both energy sector and non-energy sector greenhouse gas (GHG) emission sources and sinks. In addition to tracking GHGs, LEAP can also be used to analyze emissions of local and regional air pollutants, making it well-suited for studies like climate co-benefits of local air pollution reduction. LEAP not only supports energy policy makers in their decision making process, but it also provides a strategic integrated energy and environment scenario study. These include energy outlooks (forecasting), integrated resource planning, greenhouse gas mitigation analysis, energy balances and environmental inventories. The use of LEAP in reducing GHGs emission in China and the implementation of renewable energy and energy efficiency options in South Africa will be presented to show its benefits.

LEAP has been adopted by hundreds of organizations in more than 150 countries around the world. Its users include government agencies, academics, non-governmental organizations, consulting companies, and energy utilities. It has been used at many different scales ranging from cities and states to national, regional and global applications. LEAP is fast becoming the de facto standard for countries undertaking integrated resource planning and greenhouse gas mitigation assessments, especially in the developing world.



Mohamed Youba Sokona is a Senegalese citizen of Malian decent. Prior to joining the MEEM program, Mohamed was interning at the Stockholm Environment Institute- US Center in Boston. There, he helped develop a new web interface for the institute website and help develop and update support and training material for the Long Range Energy Alternative Planning System (LEAP) develop at the institute. He graduated from the University of Illinois with a bachelor of science in General engineering with a concentration in computer science. Throughout college, he was a member of the solar cooker team of the Engineer Without Borders (EWB) chapter of his school. Also he participated in business plan competitions presenting projects on renewable energy and green construction opportunities in Africa.

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Bioenergy and Climate Change at village level as input for policy formulation– Case study of Nyando District in Kenya

Shadrack Kiprono Kirui

Over 2.5 billion poor people in the world rely on bioenergy for their daily basic energy supply. These however have diverse effects on their health as well as putting pressure on the existing resources like forests and watersheds. Most developing countries lack the necessary knowledge that would enable them come up with policies that foster good practices in using these energy options. Policy Innovation Systems for Clean Energy Security (PISCES) project aims at creating knowledge on the policies and policy processes required in turning bioenergy in poor countries into economically, socially and environmentally sustainable energy option.

While the importance of bioenergy has gained momentum both locally and globally due to the role it plays in mitigation of greenhouse gases and subsequent global warming, its use at the village level has been going on from time immemorial, using very inefficient appliances and under unhealthy environment, thus posing more danger to human health as well as the natural vegetation.

African Centre for Technology Studies undertook a study under the PISCES project aiming at providing baseline information on bioenergy consumption, and the relationship to climate change at the village level, using specific variables related to farming, livelihoods and climatic seasonal variations. The study was conducted in 2009 in Oyola and Wakesi villages in Kano Plains, Nyando District, in Kenya. Climate change stressors in this area are frequent droughts as well as floods. The study notes the response of the residents with regards to their daily consumption of biomass energy and related appliances. It also looks at the relationship between household energy consumption and climate change in the target villages.

Data were collected in the two villages by individual interviews using a pre-designed questionnaire. The study has revealed that, with regard to agriculture, more drought tolerant crops and livestock are being favored by the local people, in response to the severity of climate change. On the other hand, little is being done to introduce improved crop varieties and livestock breeds, or improved energy appliances. It was evident that biomass fuel is becoming scarcer due to the diminishing vegetation cover in the area and poor crop yields. While in more

flooded areas there has been some effort by the communities to shift to more portable appliances, such appliances are of low quality and low efficiency. There is need for intervention to introduce cleaner and more efficient stoves.



Shadrack Kiprono Kirui has a background in surveying and mapping and was a research assistant at the African Centre for Technology Studies (ACTS) before joining the Master of Environmental and Energy Management. While at ACTS, participated in mapping of climate change hot-spots in flood prone areas, climate change and cities as well as national discussion on bio-energy strategies and policy and co-published two bio-energy policy briefs with Prof. Judi Wakhungu (ACTS Executive Director) and Dr. Bernard Muok (PISCES Project Manager) which can be found in PISCES website (www.pisces.or.ke).

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Gender and Energy Activities in Nepal

Pratikshya Pradhan

Nepal's total energy is supplied by traditional sources and residential sector consumes major share of it. Traditional sources such as fuel wood, animal dung and agro-residue are unclean fuels that are identified as lowest part of Household Energy Ladder and women are the main procurer and user of these fuels in rural households in Nepal. Women and children spend their time in collecting fuel wood and are also affected by smoky environment caused by burning such fuel while cooking. For women, energy is basically required for fulfilling their practical daily needs whereas men perceive energy as means of performing productive work. Thus, men and women are differently affected by energy scarcity. These differential gender energy needs has to be clearly identified for effective implementation of the energy policy and programs. In Nepal, various governmental and non-governmental organizations are working in energy sector among which Centre for Rural Technology, Nepal (CRT/N) is also one of them contributing in the enhancing livelihood of rural population through intervention of suitable energy technologies. CRT/N hosts Gender, Energy and Water Network (GEWNet) which is Nepal National Focal Point of ENERGIA: International Network on Gender and Sustainable Energy, The Netherlands since 2002. Under the framework of GEWNet, the organization has been carrying various activities on advocating and lobbying for integrating gender concerns in energy sector, building capacity of network members in addressing gender issues, and sharing information. The Network has capacitated its members, comprising of governmental/non-governmental organizations, individuals and students. GEWNet also tested "Gender Analytical Tool" developed by University of Twente and ENERGIA in one of the CRT/N Improved Water Mill (IWM) Program area. It was useful for identifying stakeholders, gender needs of IWM technology and developing gender goals and indicators, hence, making IWM program more gender responsive. Understanding the nexus of gender and energy, CRT/N has been providing continuous effort towards making energy programs more gender responsive. The gender responsive strategies has helped in achieving practical, productive and strategic gender needs of rural people of Nepal by meeting their energy requirement and empowering them through technological intervention. In these ways, Centre for Rural Technology, Nepal has been supporting the efforts of

Nepal Government in addressing the issue of gender and energy scarcity in the country.



Pratikshya Pradhan from Kathmandu, Nepal has a Masters in Environmental Science from Tribhuvan University, Nepal and currently participates at the Master Energy and Environmental Management (MEEM) at the University of Twente, The Netherlands. She joined Centre for Rural Technology, Nepal (CRT/N), National Non-Government Organization, as Programme Officer in 2007 and was responsible for coordination of Gender, Energy and Water Network (GEWNet) supported by ENERGIA: International Network on Gender and Sustainable Energy, The Netherlands. In CRT/N, she also coordinated National Improved Cook Stove Network supported by Asia Regional Cookstove Programme (ARECOP), Indonesia and South Asia Evidence based Policy in Development Network (SA ebpdn) supported by Centre for Poverty Analysis (CEPA), Sri Lanka. She was also involved as a team member in formulation of Clean Development Mechanism Project, "Efficient Fuelwood Cooking Stoves in Foothills and Plains of Central Region of Nepal" which is under progress.

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Session 2:

Energy policy

Indonesia Natural Gas Policy

Aldi Hutagalung

There are 3 major problem of Indonesia Natural Gas, the availability (security of supply), capability of purchasing (willingness to pay), and access (Infrastructure availability). The issue of security of supply arises based on the condition where demand growth faster than the natural gas supply. In welfare economic perspective, this is the condition where the state has to make an efficient natural gas allocation among the claimant consumer by setting a rank sector priority among the biggest consumer of natural gas to favor the development of domestic industry. This policy closely related to price mechanism, where a tradeoff has to be made between high price for export and low price for domestic consumption. Government energy pricing should have multiple implicit or explicit objectives. These include economic efficiency, government revenues, equity and incidence (maintenance or improvement of income distribution, or promotion or protection of particular sectors or groups) demand management, domestic energy resource development and security of supply. Access or infrastructure availability heavily depends on private sector investment. The state generally has to supports institutions that facilitate the functioning of markets and of the economy and of society as a whole and contributes to framing of actors in their mutual relations, a condition which was difficult to achieve because of domination of the incumbent state own company. The answer for these three linked problems will be explored in this thesis and will be proposed as an alternative policy for Indonesia's natural gas market.



Aldi Hutagalung is a holder of a Master Degree in Chemical Engineering from the University of Indonesia and currently a PhD candidate at CSTM, University of Twente conducting a research on Natural Gas Economics and Policy. Since 2006 he works for the Ministry of Energy and Mineral Resources ,Indonesia 2006-Present

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Biofuels, human rights and entitlement in Colombia: a multilevel analysis of dynamics and processes of socio-environmental conflicts

Vicky Marin

The Colombian government established an ambitious biofuels strategy with 7 million ha of land estimated as the potential area for biofuels production. However, the enabling policy environment required to meet this ambitious target, has also produced less-desired phenomena, such as land grabbing practices, displacement, human rights violations, water conflicts and environmental damage. The discussion with regard to the Colombian situation is framed within the larger global debate on the local impacts of the emerging global market for biofuels in developing countries.

I propose a research project that uses concepts and analytical tools of political ecology, ecological economics and human rights under the umbrella of Giddens' structuration theory and Leach et al. environmental entitlements approach to: i) investigate the socio-environmental effects of biofuels cultivation and production that affect the rights and entitlements of local communities in Colombia and the conflicts emerging from this, and ii) analyze the dynamics of the ecological, political, socio-economic and institutional processes, at different levels (International, national and local) that contribute to such outcomes. I argue that a tangled network of varied international, national and local processes, dynamics and institutional factors related to the development of biofuels lead to socio-economic and environmental outcomes that affect the rights and entitlements of people at local level leading to socio-environmental conflicts.

First, I use the concept of social metabolism (ecological economics) to explain the dynamics at international level that influence the outcomes at local level, i.e. the flows of palm oil from Colombia to European Union due to the increasing need for feedstock to produce biodiesel as a result of the EU biofuel policies. I take statistical data of market indicators (imports/exports) and analyze them in light of their relation with local expansion of plantations and the related effects. For the analysis at national level I use concepts and analytical tools from political ecology and institutional analysis to explore how national policies for the promotion of biofuels in Colombia influence access to and control over rural land by local/national

elites and how this clashes with rights and entitlements of local communities and individuals.

I propose a Human Rights approach to biofuels as an alternative to approaches based on sustainability criteria and certification. I argue that although certification schemes exert pressure on producers through consumers' control, they are market mechanisms that don't offer effective redress and protection to local communities and individuals negatively affected by biofuels production and expansion of feedstock plantations. Therefore, I propose a framework for a human rights-based assessment of biofuels that constitute a tool to claim and enhance protection of the local people's rights and entitlements before international, regional and national institutions. I use this framework, together with analytical tools of the entitlements approach (political ecology), to analyze the dynamics and impacts at local level.



Victoria Marin is a PhD student at CSTM since June 2009. Her research interests focus on the linkages between natural resources, human rights, entitlements, development and conflict. She positions her research within this broad context in order to investigate the mechanisms and processes at different levels that connect biofuels production with conflict, violence and human rights violations in the areas of potential or current production of biofuels/feedstock in Colombia from a political ecology perspective.

She holds a degree in Law from Colombia (1999), a Master degree in international and European law (LL.M) from Utrecht University (2004) and a Master degree in International Relations (MA) from Bologna University (2008). Before joining CSTM, she worked as a lawyer for eight years in private companies in Colombia giving legal advice in international affairs. She also lectured in International Contracts and International Commercial Law at EAFIT University in Medellin-Colombia.

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Session 3:

Cleaner Production

CP4BP Sustainable products in Vietnam

Huong Thu Ta

The Design for Sustainability (D4S) approach can be defined as improving product design by applying sustainable criteria. This approach was adopted in Latin America, Africa, Eastern Europe and Asia. Due to its multilateral benefits to the producing companies, workers and final consumers, the Cleaner Production for Better Product (CP4BP) project was launched in November 2007 in Vietnam, Cambodia and Lao PDR, involving the Asian Institute of Technology Centre in Vietnam, Delft University of Technology, Vietnam Cleaner Production Centre, United Nation Environment Programme, Lao National Chamber of Commercial and Phnom Penh Small and Medium Industry Association.

The main activities organized within the framework of CP4BP include, among others: Train-the-trainer workshops; Pilot projects and research studies in 3 target industry sectors (new or re-designed products), involving European partners, authorities and local communities; 5 Sector-specific workshops for companies in the three countries; National Working Conference and recommendations for a National Action Plan for sustainable product design; Dissemination of the CP4BP resource kit and lessons learnt in Vietnam, Cambodia and Lao PDR. In Vietnam, eight enterprises were selected to participate in eight demonstration projects in three sectors: handicrafts (3 enterprises); furniture (3 enterprises) and aquaculture (2 enterprises).

Taking Ando – a small scale handicraft company producing ceramics – as an example, recommendations given include: Reduction of use of raw materials and energy consumption by design improvement (Reducing thickness and shape of product; avoiding the use of the gypsum mould; eliminating concentrated pressure); Improvement of baking process to reduce cracking and peeling of product; Use of less toxic materials during glazing; Replacement of iron buckets and tools with stainless steel equipment; and Improvement of working area by improving lightning, ventilation and ergonomic seating. The project resulted in: 20% reduction of “false product”; 20% increase in use of natural materials; and 15% product increase and reduction in air bubbles due to mechanization of the casting process.

Overall, this project has achieved satisfactory results as product-related CP and D4S approaches were developed and tested in 3 priority industry sectors. It has also raised awareness and built capacity for industries, supported intermediaries, local and national authorities, and communities (ca. 700 direct beneficiaries). CP and D4S tools have been disseminated to key organizations and authorities. Business opportunities and environmental indicators of 8 pilot companies have been improved during the project.

Following the successes of CP4BP, Sustainable Product Innovation (SPIN) project has been implemented and funded by the SWITCH-Asia Programme of European Union since 2010. At this later stage, SPIN will be accomplished on a large scale with at least 500 businesses in 5 sectors to develop and produce more sustainable and advanced products for the domestic, regional and European markets.



Huong Thu Ta is an Environmental Engineer and joined the Master of Environmental and Energy Management for the 2010/2011 programme. She has been working for the Vietnam Cleaner Production Centre at Hanoi University of Technology since January 2010.

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Resource Efficient and Cleaner Production in Zimbabwe: case studies, challenges and opportunities for up-scaling

Tawanda Collins Muzamwese

Industrial production processes have adverse impacts on environmental compartments (soil, water and air) and therefore require preventive strategies to enable resource productivity, waste minimization, energy efficiency and environmentally sound chemical usage. Resource Efficient and Cleaner Production (RECP) has been implemented by National Cleaner Production Centres (NCPCs) in developing and transition countries guided by United Nations Industrial Development Organization (UNIDO) and United Nations Environment Programme (UNEP) since 1994. What were the achievements, opportunities and barriers for up-scaling widespread adoption of these technologies, and how should future programmes be adjusted to improve successful project impact in Zimbabwean context? This paper focuses on the experiences of Zimbabwe National Cleaner Production Centre (NCPC), one of the first 8 NCPCs established globally in 1994. Based on evaluation criteria of 5 key NCPC functions [Cleaner Production assessments (in-plant assessments), training and capacity building, information dissemination, policy advice and environmentally sound technologies ESTs], results of the programme are presented, highlighting lessons learnt during implementing RECP especially in SMEs. The programme has achieved 13 Demonstration projects, 43 in-plant CP assessments, 478 sector professionals training, 140 trained SMEs, RECP policy advice and publicity material since inception. However, financial, legal, policy, organizational, technical barriers, and institutional sustainability have individually or collectively reduced effectiveness of implementing RECP in Zimbabwe. Proposed shift in focus towards up-scaling RECP to widespread adoption amongst Zimbabwean SMEs faces certain challenges and opportunities. What are the current policy framework conditions and the inherent industrial obstacles? At enterprise level the paper focuses on two case studies from leather tanning and beverage sectors respectively, demonstrating practical implementation of RECP as well as using the case studies to illustrate barriers to successful implementation. Through implementing RECP, leather tanning SME achieved 50% COD reduction, 64% sulphides reduction, more than 50% chromium recovery and \$16500 annual savings. Medium scale brewery reduced Specific Water Intake (SPI) from an average of 16hl/hl beer to 6,5hl/hl beer through replacing old inefficient production

lines, Cleaning in Place (CIP), condensate recovery, onsite recycling and simple good housekeeping options. In conclusion the RECP project in Zimbabwe has demonstrated that SMEs can achieve energy efficiency, competitiveness, improve resource efficiency, minimize waste generation, whilst making profits. At programme level regional collaboration has improved technical capacity and financial sustainability.



Tawanda Collins Muzamwese holds a BSc Honours Degree in Applied Environmental Sciences from University of Zimbabwe and is a certified National Trainer in Cleaner Production, ISO 14001 EMS and EIA capacity building courses. Before joining the Master Environmental and Energy Management worked for the Scientific and Industrial Research and Development Centre (SIRDC)'s Zimbabwe National Cleaner Production Centre as an Associate Research Scientist/Head of Industrial Environmental Management (IEM) and Cleaner Production (CP) Division. He coordinated the national Cleaner Production project in SMEs as the national focal person for Cleaner production in Zimbabwe. Through representing Zimbabwe at various regional and international levels on CP issues, Mr Muzamwese links International Organizations to local SMEs. He was elected as an Executive Board Member of the African Round-table on Sustainable Consumption and Production (ARSCP) for 2010-2012 in June 2010 to represent Southern Africa; also a member of the Climate Change Working Group (CCWG) of Zimbabwe and the National Sanitation Committee (NSC). Major projects carried out by Mr Muzamwese cover industrial sectors in leather tanning, cement manufacturing, battery manufacturing, tobacco processing, irrigation and beverage industries.

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