JUNI 2006 | VOLUME 3 | NR

reCOMMEND 5

reCOMMEND IS A NEWSLETTER OF THE COMMUNITY FOR ENERGY, ENVIRONMENT AND DEVELOPMENT

EDITORIAL

This fifth issue of reCOMMEND introduces you to a new approach to electricity planning, tested under the IMPROVES-RE Programme in West Africa. A number of articles show how LEAP can be applied in various different ways: New features of LEAP are explained, as well as the RETScreen tool and the work of the Global Network on Energy for Sustainable Development. A new feature in this issue is the interview with one of the COMMEND members, Justina Uisso of the Ministry of Energy in Tanzania.

We warmly welcome your feedback on this issue, as well as suggestions for articles for publication in future issues of the newsletter.

Happy reading,
reCOMMEND EDITORIAL TEAM

CONTENTS

COMMEND
Community for Energy, Environment and Development

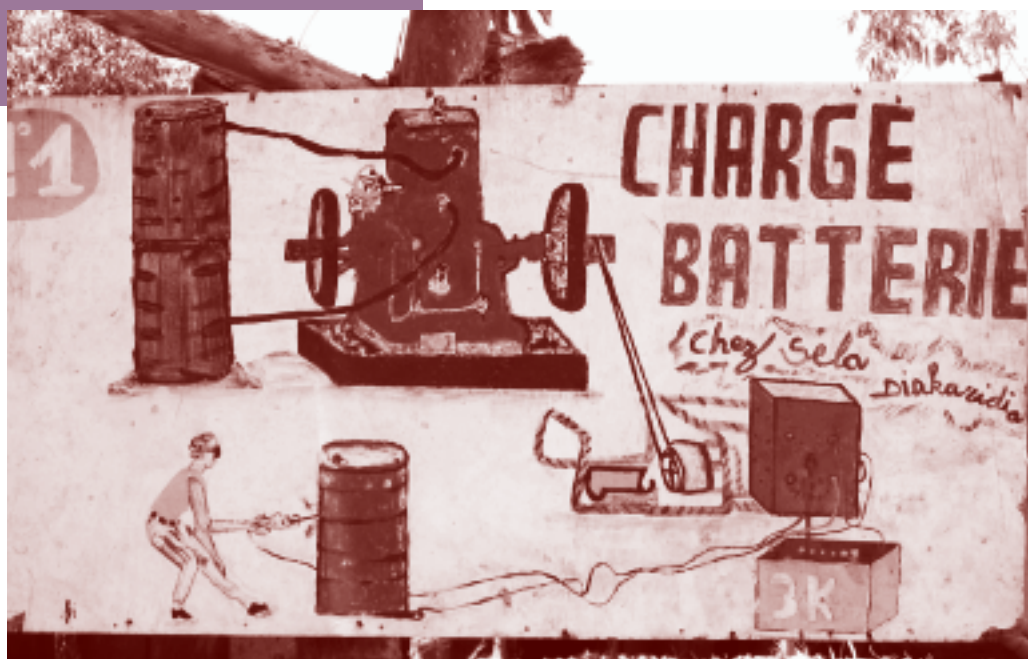


Photo: IMPROVES

IMPROVES

A New Approach to Electricity Planning

Ellen Hoog Antink and Maaike Snel
ETC ENERGY

IMPROVES-RE is an EU-financed energy planning programme in four countries in West-Africa. This article introduces the methodology and activities of the programme, and illustrates it with specific examples from Mali, one of the project countries.

WHAT IS IMPROVES-RE?

Improves-RE (Improving the Economic and Social impact of Rural Electrification) is an EU-funded programme that aims to reinforce the impact of rural electrification in Mali, Burkina Faso, Niger and Cameroon. The programme is a partnership between IED (France), ETC (The Netherlands), RISOE (Denmark) and organisations and national governments in the four project countries.

IMPROVES-RE aims to develop and test an alternative electricity planning approach, which prioritises those villages where the highest socio-economic impact can be reached. In order to visualise the results and make the planning more accessible, Geographical Information Systems (GIS) will be developed. All data gathered in the programme are put in a database and reflected on GIS maps. The maps will show possible scenarios for electrification, and will visualise the area surrounding the village that is supposed to be impacted by electrification. For Burkina Faso, the GIS system will be internet-based and as such easily accessible online.

reCOMMEND

Newsletter of the COMMEND initiative

COMMEND –COMMunity for Energy, environment and Development- aims at fostering a professional community among Southern energy analysts. COMMEND is an open community intended to be accessible to all energy analysts, and designed to foster mutual assistance between its members.

COMMEND is being funded by the Government of the Netherlands and undertaken as a collaboration between the US Center of the Stockholm Environment Institute (SEI) and four leading international institutions working on sustainable energy development: the Institute for Energy Economics of the Fundación Bariloche in Argentina (IDEE/FB), ETC Foundation in the Netherlands, ENDA-TM in Senegal, and the Energy Research Centre in South Africa (ERC).

The newsletter is distributed free of charge and is available through the COMMEND web site.
To subscribe, contact Anja Panjwani at the ETC Foundation.

Editorial team
This issue has been compiled by: Charlie Heaps and Anja Panjwani.

Contact reCOMMEND
Anja Panjwani, ETC Foundation
P.O. Box 64, 3830 AB, Leusden, the Netherlands;
Tel: +31.33.432 6000; Fax: +31.33.494 0791; Email: a.panjwani@etcnl.nl
COMMEND web site:
www.energycommunity.org

Design
Labl.nl, Zeist

Printing & Layout
Koninklijke BDU Grafisch Bedrijf B.V., Barneveld

Funding
This newsletter is supported by the Netherlands Directorate General of International Cooperation (DGIS).

THE METHODOLOGY

The IMPROVES-RE planning methodology is based on a combination of theories from spatial planning, a 'potential impact assessment' and more conventional electricity demand analysis. It basically consists of two steps:

- Identification of so-called 'development poles': villages that should be electrified first.
- Electrification planning from these villages to surrounding villages.

DEVELOPMENT POLES

In order to assess where rural electrification would have the highest impact, a special development indicator has been developed. This development indicator is the result of a multi-criteria analysis, where the criteria are based on the Human Development Index. As such, the presence of infrastructure in health, education and market sectors in villages is assumed to be an indicator for the expected impact of electrification of the village. For each country these criteria are adjusted to the local situation. Based on the output of this multi-criteria analysis, the villages in the pilot area get a development indicator.

In addition to the development indicator, the importance of a village to its surroundings ('hinterland') also plays an important role. The analysis looks at the number of people using village services (e.g. number of people coming to the hospital) and examines the distance to other villages with high development indicators. Thus, the impact of electrification is not limited to the electrified village, but stretches to those people using that village's services, but who live outside of the village.
This assessment results in a priority list, where those villages scoring highest are identified as the 'development poles' of the region.

Photo: IMPROVES

Watching television in Mali.

ELECTRICITY PLANNING

After identification of the development poles, conventional electricity planning takes place, based on an assessment of the electricity demand in the area and basic economic considerations. This results in a map of the region with clusters of areas to be electrified. Each cluster is composed of development poles and those villages that subsequently can be electrified in a financially viable way.

MALI: THE METHODOLOGY IN PRACTICE

In Mali, the project's kick-off workshop took place in July 2005. A planning committee considered how other development sectors are affected by electricity and vice versa. Members of the committee, who work in various ministries, were asked to facilitate the collection of the necessary statistical data.

The pilot zone in which the methodology would be tested was chosen to be 'Cercle du Dioilla', which is a three-hour drive east of Bamako. Based on the presence of infrastructure like hospitals, schools and markets, a preliminary multi-criteria analysis was carried out, which led to a draft selection of development poles. Then key actors in Cercle du Dioilla were interviewed. In the interviews, they were asked to name those villages that they considered to be development poles, asking them to take into account future impact of electrification and its function in the region.
They were also asked to name their criteria for choosing these development poles.

In addition to the interviews and the statistical analysis, questionnaires were used in the pre-selected development poles. These questionnaires were used to identify the development poles, the main fluxes (e.g. of people or goods) into these development poles, and to help assess the electricity demand in the region. The combined result of the multi-criteria analysis, the interviews and the questionnaires led to a final definition of the development poles. The next step was to develop rural electrification plans in each country. These plans will be discussed both at local and at national level.

PRELIMINARY CONCLUSIONS

Based on the work done in Mali and the other three countries, some preliminary conclusions can be drawn:

- It is important to not use only one source of information, but instead to combine the information from the statistical analysis, the interviews and the questionnaires.
- The results of the statistical analysis are considered to be quite accurate. Key actors in the local area mentioned many (but not all) of the development poles which had been identified in the statistical exercise. On the other hand, these key actors were able to identify some additional development poles, which had not been identified through the statistical analysis.
- The choice of respondents is critical: personal preferences or political biases of the respondent can lead to the identification of very different development poles.
- The criteria for 'local economy' appeared to be difficult to choose. Besides presence of markets, the presence of local banks was considered to be an important indicator.

PROJECT IDENTIFICATION

A small part of IMPROVES-RE is dedicated to project identification. Even

Photo: Improves

Using electricity to sell cold water in Mali.

though financing and implementing such projects cannot be taken on within the current programme, we would like to bring up the discussion about existing and possible future electrification projects.

In their electrification plans, national governments almost always focus on the big and/or international investors, leaving local entrepreneurs with no support. Mali is an exception, where a special policy for so-called 'spontaneous initiatives', has been developed. Local entrepreneurs who want to invest in electrification of a village or region can apply for an 80% subsidy on total investment costs. Although the areas of electrification are much smaller, this has by now attracted 50 applications, of which 13 are considered to be serious.

Yet also in Mali, many existing entrepreneurs are overlooked. In the IMPROVES-RE pilot zone at least three entrepreneurs are now providing electricity to 50-80 clients each, through a small grid. They are all doing this unofficially and the quality of the hardware and service is not very high. Still, they are the only providers of electricity in the region and are able to generate an income from their business. We believe that they can be important building blocks for rural electrification, as they build on the entrepreneurial skills of local businessmen, who are both economically and socially embedded in the region and thus more sustainable in the long term. Up to now, government policy is not targeting these operators, leaving a potential option for electrification untouched. IMPROVES-RE aims to increase the knowledge on the dynamics of these local operators and to find out what is needed to support them in improving and sustaining their business.

OPERATOR IN BELECO, MALI: MR. BOURAMA COULIBALY

Mr. Bourama has a mini-grid driven by a diesel motor and generator in Beleco. He serves 50 clients with his grid. The grid, however, is not his only income. Mr Bourama is a photographer and runs a photo store. Also, with the electricity he generates, he is able to run a battery charging station and a refrigerator, from which he sells water and ice in front of his store.

He does not consider his mini-grid to be very important, because the income is not very high. During the day he uses approximately five liters of diesel to run the refrigerator and the battery charger. Together, the income from this business is much higher than the income he obtains from the mini grid which uses eight liters of diesel for six hours at night. The mini grid earns him 15.000 CFA a month, which he sees as a side income only.

Although Mr Bourama has been actively informed about the subsidy possibilities through the government, he is not really interested. The procedure to be followed is too difficult and too long, and he has doubts on the profitability of the electrification business.

For more information:

Please contact: Ellen Hoog Antink, ETC-Energy;
Email: e.hoogantink@etcnl.nl

Developing a National Energy Model in Thailand

Thai academic researchers and government agencies are cooperating to develop a common platform for energy planning and modelling. An agreement in principle to develop a Thailand National Energy Model (TNEM) was reached at a training course on energy modelling workshop in Bangkok during 27-30 March 2006. The energy accounting tool chosen as the platform for the TNEM will be the Long-range Energy Alternative Planning system (LEAP).

Peter du Pont
JGSEE

One of the current problems in the area of Thai energy planning and research is that several different organizations carry out data collection and analysis in parallel, but with little common sharing of data. These include the electricity demand forecast, the overall forecast for energy, long-term scheduling of purchases from power suppliers, governmental programs to increase use of renewable energy for small power plants, or the extension planning of the natural gas grid by the national gas supplier. Many of these analyses draw on the same data, but there is no formalized framework for sharing of baseline data and reporting/discussion of results.

Additionally, organizations involved in the energy business use different databases and planning tools to conduct their energy forecast, so that the results are often difficult to compare. With the development of TNEM, it is envisioned that energy officials and researchers will be better able to coordinate and share their data related to energy planning, modelling, and scenario development. By taking an inclusive approach, and. involving government agencies, research institutes, academic units, and non-governmental organizations, it is hoped that TNEM will contribute to the building of local capacity for energy planning, demand modelling, etc. Too often in the past, energy planning has been outsourced to foreign consultants, when it could be done locally with less, and more effective, international technical input.

BACKGROUND

TNEM is being developed and coordinated by the Joint Graduate School of Energy & Environment (JGSEE), a Thai-based network of research and study in energy and environmental technologies and policy. The development of TNEM is linked to an important new research project to provide research input and analysis into the development of sustainable energy policy and implementation plans for the Thai government. The project is called "Policy Research for the Promotion of Renewable Energy and Energy Efficiency in Thailand." It is funded by the Ministry of Energy and the Energy Policy and Planning Office (EPPO) and managed by the Thailand Research Fund. The research is being implemented and coordinated by JGSEE, with a network of more than 30 researchers from 10 leading Thai universities involved in the project. Additionally, there is significant input and peer review from foreign experts (both overseas and Thai-based) on the research analysis framework and outputs.

The research project is important at this stage, since it will provide direct support for Thailand's very ambitious and pro-active set of energy policy targets. The new targets are driven by the need to ensure energy security and economic competitiveness; the need to minimize environmental impacts resulting from energy production and use; and the need to contribute toward global efforts in reducing greenhouse gas emissions.

The two main national policy targets are:

- Renewable Energy (RE): to increase the contribution of commercial RE to primary total primary energy demand from 0.5% in 2003 to 8.0% in 2011 (with a 5% renewable portfolio standard, or RPS, in the power sector); and
- Energy Efficiency (EE): to reduce energy elasticity (ratio of energy demand growth to GDP growth) from 1.4 to 1.1 during the same time period.

Additional policy targets include reducing total energy consumption by 20% by 2009; reducing oil use for transportation by 25% (with the use of natural gas, gasohol, and biodiesel) by 2009; increasing the contribution of biodiesel to 8.5 million liters per day by 2012; reducing energy consumption in the industrial sector by 25% by 2008; and reducing energy consumption in public offices and buildings by 10-15% immediately.

JGSEE sees TNEM as important for developing a common platform for future forecasts, scenarios, and analyses to support energy policy. Having a common core tool (LEAP) with a common set of national baseline energy data and projections, will support decision-making on the promotion of energy efficiency and development and deployment of renewable energy.

Photo: P. du Pont, JGSEE

THE ROLE OF LEAP

As a critical tool for integrating the findings of different research groups working on energy policy, JGSEE is developing expertise in energy accounting and modelling. JGSEE's first step was to organize an intensive four-day training course entitled Energy Scenarios Using the LEAP Accounting Tool, during 27-30 March 2006.

JGSEE chose LEAP as the "energy accounting tool" that will be used to integrate the outputs from each of the research groups in order to come up with an overall assessment of costs, benefits, and environmental and social impacts of the proposed set of RE and EE policies and measures. A major objective of the course was to develop skills in energy scenario analysis to support the work of the Thailand Energy Policy Research Project.

The training course provided a hands-on introduction for a diverse range of participants who are involved in the energy business – government officials, academic researchers, development agencies, and consultants. A benefit of the training course was that the participants were able to share data and viewpoints and to see the benefit of having a common, flexible platform for energy planning, modelling, demand forecasts, etc., and to develop a basic set of reference data for that platform, based on government data.

The course was led by Dr. Charlie Heaps, LEAP developer from the Stockholm Environment Institute – U.S. Center. Support was provided by Dr. Bundit Limmeechochai of SIIT-Thammasat University (an affiliate of JGSEE), who has extensive experience with energy modelling and is leading the modelling analysis for the Thailand Energy Policy Research Project.

CURRENT ACTIVITIES AND PLANS FOR THE FUTURE

Currently the network of JGSEE and associated researchers are working on a "current account" scenario, in which the Thai energy sector is structured and subdivided into different demand and supply sectors and historical data is entered into LEAP. The data covers all energy demand sectors as well as electricity transmission and distribution, electricity generation, charcoal making, oil refining, and coal mining.

The data includes historical data that will be used as the basis for a number of scenarios.

It is planned to develop more than 40 scenarios containing energy saving measures like "efficient lighting in residential sector", application of renewable energy technologies like "biomass power plants" and sensitivity analysess such as "cost decrease of hydro power". The scenarios will be combined with each other and the results compared to rank the measures according to their helpfulness to reach the goals that are set by the Thai Government. The next steps in the project could be to research the emission of greenhouse gases and emissions that are harmful to health like nitrogen oxides (NOx), sulfur oxides (SOx), particulate matter (PM) and others. When these emission factors are entered into LEAP, political measures or technology improvements to reduce them can be simulated and ranked according to their positive effect. Another future option could be to enter prices for energy producing technologies and to compare the different options with each other and with energy saving technologies. By this approach, the project will aim to identify the least cost way to meet the rapidly growing energy demand in Thailand.

The main obstacle in the beginning of the project was the lack of data. The available data was often of bad quality or was not detailed enough. The results from different reports were often contradictory and sometimes offered illogical values. So it was deemed necessary to find more comprehensive and more reliable sources. If this was not possible the required values had to be calculated with the help of related reports.

JGSEE plans to complete an initial baseline set of energy data for TNEM, and to present this, along with a range of policy scenarios, to the Thai government by August 2006. In a future issue of this newsletter, we will report on the results.

For more information:

Please contact: Dr. Peter du Pont, Lecturer/Researcher, Energy & Environmental Policy Group, JGSEE; Email: pdp@dem.dk

COMMEND Members

Justina Uisso

Justina Uisso, Senior Research Officer, Ministry of Energy and Minerals, Tanzania

Could you please tell us a bit about your background?
In 1987 I graduated in Bsc Statistics at the University of Dar es Salaam, Tanzania. The same year I was appointed to work with the Ministry of Energy and Minerals as a statistician. From 1993-1995 I attended a Master degree course at ITC International in the Netherlands where I graduated with a specialization in Rural Energy Development.

Which kind of work are you involved in right now?
At the moment I am working in the energy development section of the energy department in the Ministry of Energy and Minerals. I am responsible for energy policy and planning and for our Energy Management Information System (energy database). In that respect I am coordinating the formulation of the Rural Energy Agency and Rural Energy Fund in Tanzania, a procurement plan for the World Bank Energizing Rural Transformation (ERT) Program and activities for the World Energy Council. Then I am also involved in the preparation of the energy statistics yearbook with the International Energy Agency. Finally, I am a member of the Research and Development Advisory Committee on Industry and Energy.

Could you give an example of when your work was used as input for policy formulation or as input for actual projects development?
During the formulation of the first National Energy Policy in 1992 and during its review in 2003. Further, the information gathered was used during the implementation of the SADC Regional Energy Planning Network (REPN). The same information is also used by researchers from the University and NGOs and by the Ministry of Planning Economy and Empowerment in their preparation of the National Economic Survey.

What do you see as the most pressing problem in your work?
The most pressing problem we are facing at the moment is unavailability of biomass data, whereas biomass contributes to more than 90% of the energy balance. The cause of the problem is the lack of a mechanism to collect this type of data.

Are you making use of energy planning tools?
I have been using the LEAP modelling tool, but due to the lack of data to run such a model and the frequent updates made, it is not fully utilised. Currently, we work with a database designed for the SADC Member States which is being populated with energy data and which is used to prepare the Energy Statistics Yearbook.

Are you in touch with other energy analysts to exchange information?
We have a network of energy planners from the SADC Member States in place, the Regional Energy Planning Network (REPN). This Network has provided me with a training on the use of the SADC energy database, described above.

Do you have any suggestions which activities COMMEND might undertake to foster and strengthen such a community of Southern energy analysts?
It would be useful if COMMEND could provide best practices elsewhere that might be applicable to the SADC region. As stated above, biomass energy data is lacking in all SADC Member States and it would be helpful if COMMEND could come up with a proposal to solve this problem.

Could you tell us more about your future plans in energy planning?
Future plans in Tanzania focus on the productive uses of modern energy services in the rural areas. We have realized that having a light bulb in a house will not reduce poverty.

How does your work in the field of energy planning address the challenges of sustainable development?
Challenges of sustainable development have been addressed through the encouragement of an upward energy switch, where efforts are made to reduce reliance on biomass. The focus has been on the use of alternative energy sources, on the efficient use of energy, on energy conservation and on the sustainable use of energy in order to achieve sustainable development.

What do you think are the biggest challenges for energy planning in the coming decades?
The East African Community has in recent years experienced increases in petroleum price, as well as drought due to heavy reliance on electricity from hydropower. The biggest challenge for these countries thus would be the diversification of energy sources, including renewables and biofuels.

For more information
Please contact: Mrs. Justina Uisso, Ministry of Energy and Minerals, Dar es Salaam, Tanzania;
Email: Uisso@mem.go.tz

LOpt: A Tool for Sustainable Energy Optimization

LOpt is a software tool for optimization in the field of sustainable energy for regional energy planning. The software defines a multi-objective (goal) function and uses two other software tools: LEAP and GenOpt. This article introduces LOpt, the multi-objective (goal) function behind the software, and two application examples.

Milorad Bojic and Milan Despotovic
UNIVERSITY OF KRAGUJEVAC
Spyros Kyritsis, George Papadakis and Loukia Geronikolou
AGRICULTURAL UNIVERSITY OF ATHENS

Photo: M. Bojic

INTRODUCTION

The Long-range Energy Alternatives Planning (LEAP) software, which is probably familiar to many readers of reCOMMEND, simulates different scenarios for energy use and its influence to environment. But use of LEAP requires large amounts of time for analysis of results especially when one wishes to compare effects of several scenarios against multiple objectives for regional energy planning.

To speed up analysis of different scenarios in multi-objective tasks for regional energy planning, the Center for Heating, Air Conditioning and Solar Energy at the Mechanical Engineering Faculty of Kragujevac University in Serbia has developed a new program named LOpt. LOpt automates the use of LEAP together with an optimization system named GenOpt to determine the optimal scenario for given sustainable energy objectives. This procedure is especially useful where the objective function contains multiple goals where the optimization procedure needs to be repeated for each goal.

LOPT

The purpose of LOpt is to define a multi-objective optimization problem, to manage the data files required for communication with LEAP and GenOpt, and to solve the optimization problem by running LEAP and GenOpt*-1. The files necessary to run LEAP and GenOpt are prepared using the LOpt Data Manager. The optimization exercise is controlled by using the LOpt Run Manager.

MULTI-OBJECTIVE FUNCTIONS IN LOPT

The multi-objective function for goal programming used in LOpt is specified as follows:

$F=a_1F_1+ a_2F_2+ \ldots\ldots\ldots + a_kF_k$

where k stands for the total number of separate sustainable energy objectives, $F_1, F_2, \ldots, F_k$, stands for the separate objective functions and $a_1, a_2, \cdots, ak$ stands for the weighting factors with values from 0 to 1. If $a_N=1$ and other $a_i=0$ (i#N), then $F=F_N$ is the only objective function that would be optimized. If $a_N=1$ and $a_L=1$ other $a_i=0$ (i#N,L), then $F=F_N+F_L$ is the objective function that would be optimized.

The program currently can optimize for the following sustainable energy objectives:

- Minimize the global warming potential (CO2 equivalent);
- Minimize the cost of external pollution during electricity generation;
- Minimize the external pollution during electricity generation;
- Minimize the energy-production cost;

- Minimize the cost of combustion pollution during heat generation;
- Minimize combustion pollution during heat generation;
- Maximize the energy autonomy for investigated region;
- Maximize renewable energy use in the investigated region.

THE DATA MANAGER AND RUN MANAGER OF LOPT

LOpt has two modules: Data Manager and Run Manager. Data Manager is used to generate the files necessary to run LEAP and GenOpt together, while Run Manager controls the optimization exercise. Data manager helps extract the names of input and output variables by working with the new Application Programming Interface (API) built into LEAP.

Editor's Note: LOpt relies upon LEAP's new API feature, which is described in more detail in the article "What's New in LEAP for 2006?" in this issue of reCOMMEND.

GENOPT – AN OPTIMIZATION TOOL

GenOpt is an optimization program for the minimization of an objective function that is a function of data calculated by an external simulation program, such as LEAP. GenOpt is developed by the Lawrence Berkeley National Laboratory [*-2]. It handles optimization problems where the objective function is computationally expensive and its derivatives are not available or may not even exist. GenOpt can be coupled to any simulation program that reads its input from text files and writes its output to text files.

Figure 1: The LOpt User Interface: Preparing an optimization by selecting output variables

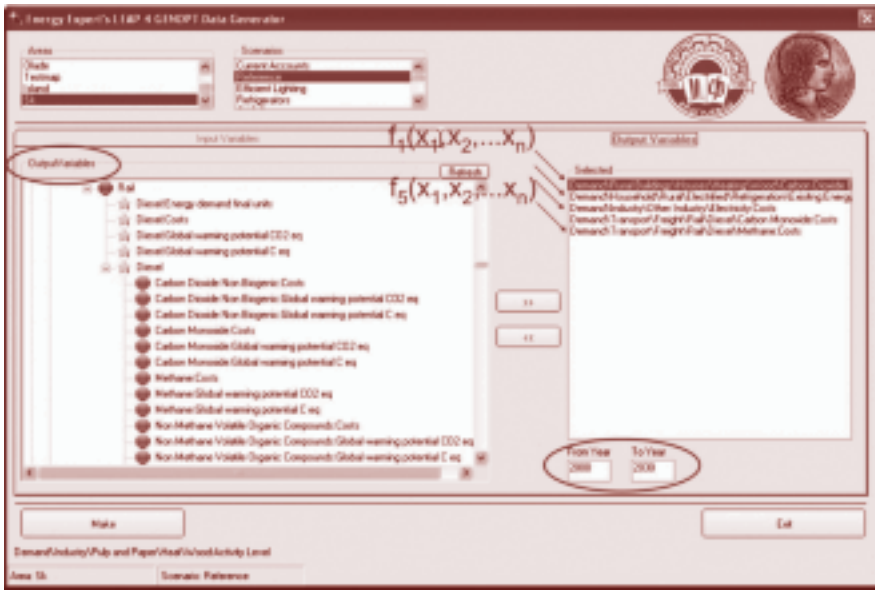
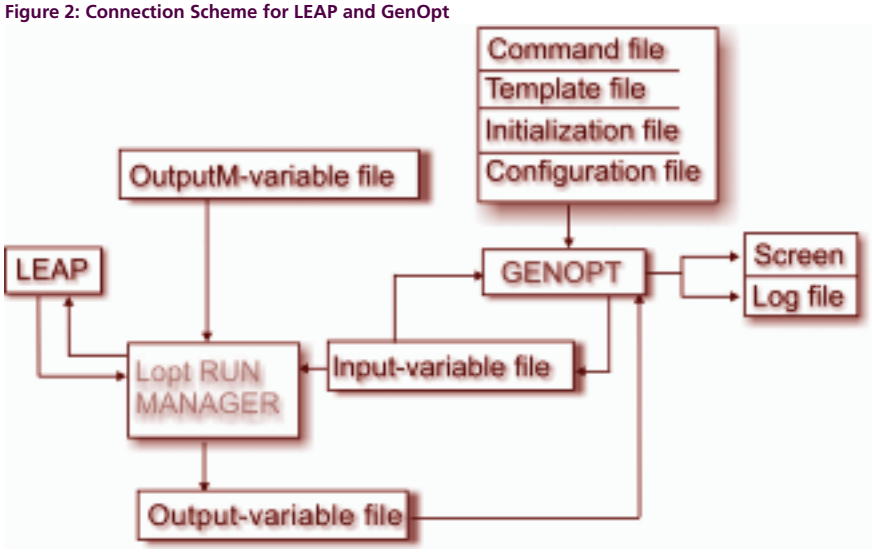


Figure 2: Connection Scheme for LEAP and GenOpt



Managing Data

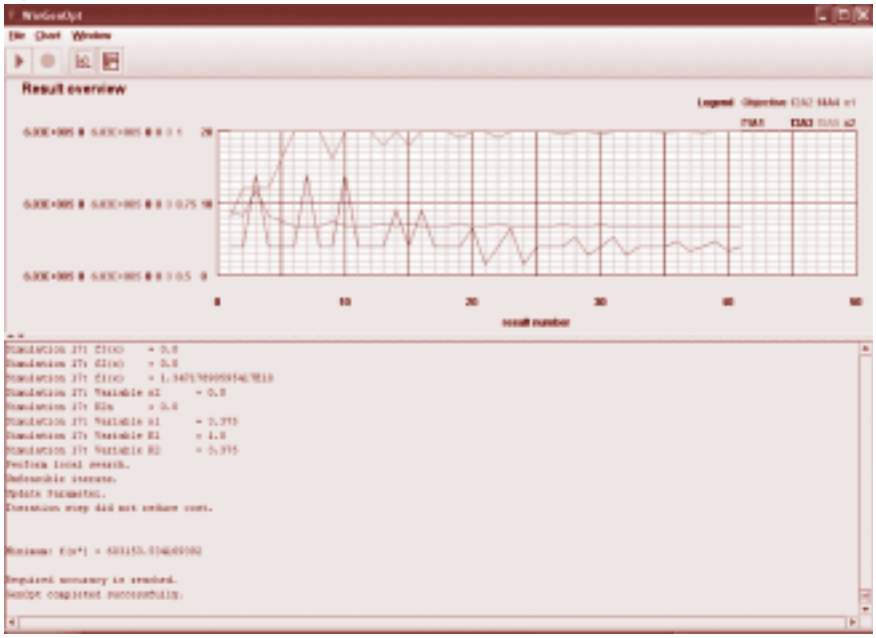
To connect GenOpt with LEAP, the LOpt Data Manager generates various command, input and output files. Two additional files – an initialization file and a configuration file need to be generated manually. Instructions for this are given in the LOpt manual. The LOpt software itself is a user-friendly windows-based software system. Figure 1 shows a sample screen from LOpt, in which the tool is being used to prepare a run by selecting output variables.

Managing a Run

Once data files and input and output variables have been defined, an optimization can be run using the Run Manager (see Figure 2). GenOpt will report on the optimization and the user can also examine the reports generated by LEAP in its Results View.

A run starts when LEAP is run for the initial values of the defined independent variables. LEAP gives values for dependent variables and GenOpt calculates values of the objective function. Then, the next run of LEAP is done for the next value of the independent variable. LEAP gives new values for the dependent variables and GenOpt gives a new value for the objective function. GenOpt compares the values of the objective functions in the two runs. Based on this comparison and the applied optimization algorithm, the software decides on new values

Figure 3:



of the independent variables that will be used for the next run of LEAP. The computer runs multiple iterations until it has determined the optimum value of the objective function and the corresponding value of independent and dependent variables (see Figure 3).

EXAMPLE: ELECTRICITY FOR DOMESTIC HOT WATER HEATING IN SERBIA

To test the new tool we have analyzed use of energy for heating domestic-hot water in farm houses in the Sumadija-Knic region of Serbia. We assumed that in farm houses in Serbia, domestic hot water is heated by using electricity from the grid, where electricity may have two origins: outside the region, or inside the region. The outside-region electricity would be a mixture of 63.8% of electricity produced by using fossil fuel and 36.2% of electricity produced from hydro power. This mixture is characteristic of the electricity coming from the Serbian grid *-3. The inside-region electricity would be produced by using short rotation biomass (SRB). For these runs, LEAP uses the unit externality costs for pollution as defined by the regulations of the Serbian government *-4

The optimization gives the following answers:

- To minimize global warming potential, the program suggests using the inside-region electricity.
- To minimize the costs for external pollution during electricity generation, the program suggests using the inside-region electricity.
- To minimize energy production costs, the program suggests using the outside-region electricity.
- To maximize electricity autonomy, the program suggests using the inside-region electricity.

CONCLUSIONS

LOpt is a new tool that for the first time allows optimization techniques to be applied to energy planning problems whilst also taking advantage of the user friendly simulation and accounting methods available in LEAP.

LOpt and its manual are currently being finalized by at the University of Kragujevac in Serbia. If you are interested in testing the software please contact the authors to request a copy. This will be available after October 2006. GenOpt can be obtained for free from the LBNL web site: http://gundog.lbl.gov/GO/index.html.

References

1 Faculty of Mechanical Engineering, User Guide for LOpt Version 1.0. University of Kragujevac, Kragujevac, Serbia, 2006.

2 Wetter M. GenOPT user manual version 2.0.0. Technical Report LBNL-54199, Berkeley, CA: Lawrence Berkeley National Laboratory, 2004.

3 Ministry of Mining and Energy, Republic of Serbia, Energy balance of Republic of Serbia without Kosovo & Metohija, www.mem.sr.gov.yu (retr.2. June 2006).

4 Government of Serbia, Regulation about types of polluters, criteria for tributaries and calculation of compensation for environment pollution, amount and method for accounting and compensation payment, 2006.

ACKNOWLEDGEMENT

This work was partially supported by the European Commission (6th Framework) - project RES INTEGRATION for which we are grateful. Also, we would like to thank Charlie Heaps, LEAP developer from the Stockholm Environment Institute, for his support to our idea by making versions of LEAP that enabled this exercise. Also, we would like to thank Mishel Weter, GenOpt developer from Lawrence Berkeley Laboratory for his advice.

For more information:

Please contact: Milorad Bojic, Faculty of Mechanical Engineering,
University of Kragujevac,
Sestre Janjic 6,
34000 Kragujevac, Serbia;
Tel: +381.34.330196;
Fax: +381.34.330196;
Email: bojic@kg.ac.yu

GNESD: Energy Network for Sustainable Development

Since 2002, GNESD (Global Network on Energy for Sustainable Development), which is facilitated by UNEP, has established itself as an influential scientific South-South-North Partnership. All interventions and activities have been guided by the networks main objective: to work for reaching the Millennium Development Goals (MDGs) through achieving a better understanding of the links between energy and sustainable development and environment priorities.

Mette Annelie Rasmussen, Moinul Sharif and John Christensen
GNESD

GNESD is a knowledge development and sharing network which is facilitated by its members. The network is supported by a secretariat which is co-located with the UNEP Risoe Centre in Denmark and headed by John Christensen. Member centres coordinate joint activities, exchange information, carry out analytical studies and provide policy support. The GNESD secretariat facilitates the work of the centres through research input, coordination, dissemination and administration, thereby making it easier for each member centre to provide environmentally sound and pro-poor energy policy advice to support sustainable development.

GNESD was launched as a Type II initiative at the 2002 World Summit on Sustainable Development as a response to recommendations from the United Nations Commission on Sustainable Development session on Energy in 2001. Today, GNESD has twenty-one member centres, eleven from developing countries and ten from industrialized countries covering most continents of the world. One common denominator is the firm belief that access to affordable, modern energy services is a pre-requisite for sustainable development and the alleviation of poverty.

MODE OF OPERATION

The network carries out an array of activities which all work towards the achievement of the main objective. Activities that can be undertaken by the GNESD members are 1) knowledge generation, analysis and study, 2) policy support, 3) capacity building and 4) advocacy, with a focus on issues of concern related to energy for sustainable development. The work in GNESD is theme-driven and carried out on the basis of ad-hoc Working Groups consisting of representatives from the participating member centers. The mode of operation is to select a theme coordinator who helps facilitate the participating centers in their detailed research work and ensures the progress made by the centers complies with the agreed terms and conditions. Presently, the theme coordinators are Stephen Karekezi, Director for AFREPREN for the Energy Access working group, and Gustavo Nadal, from the Bariloche Foundation, Argentina who coordinates the Renewable Energy Technologies (RETs) theme.

An international Steering Committee provides strategic direction and oversight. The Steering Committee is elected at the annual GNESD assembly. At present, the Steering Committee is comprised of GNESD members, donor countries and organizations, UNEP is a non-voting member of the Steering Committee which is jointly chaired by Thomas B. Johansson of IIIEE, Sweden and Ogunlade Davidson of the University of Sierra Leone.

ENERGY ACCESS (EA)

The GNESD "Energy Access" theme is to respond to two widely asked key questions on the impact of power sector reforms in the developing countries. Have energy policy reforms addressed the "energy access" problems faced by the poor, or have the reforms actually contributed to the growing problems of inadequate energy services for the poor. The Energy Access theme will be completed with a set of studies elaborating key policy options for each sub-region on how to improve access for the poor as an integral part of the reforms. This study has identified the most important policy options for each sub-region from the first phase of the study and examined in detail how these could be implemented i.e. what the barriers would be and how they could be overcome. Results will be published in the middle of 2006 and the findings will be presented in regional workshops late 2006. Based on these studies and feedback from the three

regional workshops, with participation from all relevant stakeholder groups, a summary for policy makers (SPM) will be published to provide policy makers with recommendations for making energy accessible to the poor in developing countries.

Cover of the May 2006 edition of the GNESD newsletter.

RENEWABLE ENERGY TECHNOLOGIES (RETS)

The Renewable Energy Technologies (RETs) theme aims to identify the contribution of RETs to poverty alleviation, to provide concrete policy guidance and to identify and overcome previously identified barriers to RETs. The long term aim is not only to improve the quality of life of poor households in the developing countries, but also to secure generation and development of productive activities which will create employment and improve livelihoods. This includes identifying the full potential of renewable sources, reviewing aspects of renewable energy policies in the countries under study and recommending appropriate RETs that can be usefully, sustainably and affordably harnessed in different countries. The theme's outputs will include practical and realistic policy and implementation guidelines on RET use and its role in poverty alleviation. The approach used has been to carry out country-specific and sub-regional assessments of current RE applications that identify the major barriers for RETs expansion and to provide policy guidelines for overcoming these barriers, and recommendations and strategies for increasing the integration of RE in national policy.

THE ISSUE OF FINDINGS AND IMPACT

Since its formation GNESD has established a true south-south partnership and has taken part in and influenced discussions at several global events. GNESD has helped move the debate forward in new and poorly understood subjects, such as those described above. GNESD has shown that reforms often have had negative consequences for the poor, but positive examples showed that if appropriate policies are put in place and sequencing of reforms are considered, results can be positive. When these findings were published they created some controversy but have since become generally accepted.

THE ROAD AHEAD

In the coming years GNESD will continue to concentrate on working towards supporting the achievement of the MDGs. In that process GNESD will continue to produce policy analyses that may be actively used to facilitate a change to benefit the world's poor to achieve adequate access to cleaner energy services. As the basic functionality of the Network is now fully in place, the Secretariat will therefore focus on providing more substantial support to the theme coordinators in the coming years and contribute to strengthening the capacity of all centers in the developing countries. A new theme will also be launched by mid-2006 after consultations with the Member centers. The Network will also publish several new documents in 2006 including an MDG and Energy Paper, a Summary for Policy Makers on the Access studies and on the RETs theme.

The governments of Germany, France, Italy, the United Kingdom and Denmark along with the UN Foundation have provided support to the Network. UNDP has in addition supported the Energy Access theme activities with funding going directly to Member centers.

For more information:

Please contact: Global Network on Energy for Sustainable Development (GNESD) Secretariat;
Email: GNESD@risoe.dk;
Web site: www.gnesd.org

A Clean Energy Decision-Support Tool

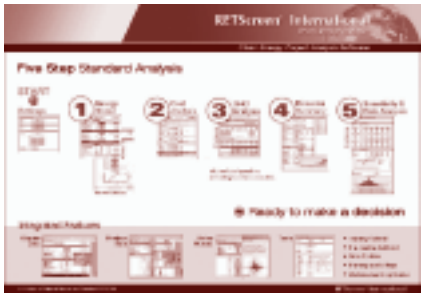
Ron Alward
NRCan/CETC-Varennes

RETScreen is a clean energy awareness, decision-support and capacity building tool that was developed by Engineers at the CANMET Energy Technology Centre-Varennes, Quebec in Canada in an effort to get clean energy technologies more routinely considered by planners and decision-makers at the critically important initial planning stage. It developed out of renewable energy projects in India and remote Aboriginal communities in Canada. RETScreen first appeared on the international scene in 1998 and has been expanded and upgraded a number of times since then.

The tool includes product, climate and cost databases, an online manual, a Website, project case studies, and an online and CD-based training course. RETScreen is available free at the website: www.retscreen.net

WHAT IT DOES AND HOW IT WORKS

RETScreen provides a common platform for evaluating all types of energy project proposals. It consists of a standardized and integrated project analysis software that makes use of Excel spreadsheets to evaluate the energy production, life-cycle costs and greenhouse gas emission reductions for various types of renewable energy and energy efficiency technologies compared to conventional energy projects. Each technology model (e.g. Solar Water Heating, Wind Energy, Small Hydro, etc.) is developed within an individual spreadsheet "Workbook" file. The Workbook file is in turn composed of four worksheets on the energy, costing, greenhouse gas and financial components. These worksheets have a common look and follow a standard approach for all the RETScreen models.



RETScreen Helpfile View

The user selects a technology model and opens the default Workbook for that technology. New data is entered into designated cells in each of the four worksheets. All output cells are protected to prevent the user from mistakenly deleting a formula or reference cell. One type of user input cell is for project reference purposes only, another has online product, climate and cost databases available to assist the user, and a third is for site specific data from the user. If the user does not have available data for a cell, an online user manual provides typical values.

A Sensitivity and Risk Analysis worksheet is provided to help estimate the sensitivity of important financial indicators in relation to key technical and financial parameters.

IMMEDIATE FUTURE

The RETScreen team, with support from a large international cohort of experts from the NGO community, industry, government and academia, is currently working on Version 4 of RETScreen. This is being done in collaboration with the Renewable Energy and Energy Efficiency Partnership (REEEP) and NASA. This version will likely be available by the end of 2006. In the new Version 4, the software's capabilities will be expanded from renewable energy, cogeneration and district energy systems, to include a full array of clean power, heating and cooling technologies, and energy efficiency measures. Its international appeal will be increased through the expansion of climate data to cover the entire surface of the planet, including central-grid, isolated-grid and off-grid areas, as well as through the translation of the software into 21 languages.

Photo: Armando Martinez

Photovoltaic Water Pumping System in Africa

All existing RETScreen models for renewable energy systems and combined heat and power, and the new models for energy efficiency measures, will be incorporated into one software file for ease of technology comparisons and project integration. In addition, RETScreen capabilities will be expanded to evaluate emerging technologies such as ocean current and wave power.

For more information:
Please contact: Ron Alward;
Email: ralward@nrcan.gc.ca;
Web site: www.retscreen.net

The Role of the National Communications Support Programme (NCSP)

National communications are increasingly becoming a strategic tool to help countries align their interests and priorities to the overall goals of the UNFCCC. The National Communications Support Programme (NCSP) is to provide technical assistance to developing countries and aims to customize its technical assistance.

Dr. Xianfu Lu and Martha Perdomo
NCSP, UNDP-GEF

THE STATUS OF NATIONAL COMMUNICATIONS ON CLIMATE CHANGE

The United Nations Framework Convention on Climate Change (UNFCCC) came into force in 1994 and has since been signed by over 150 countries. It is the overall framework for intergovernmental efforts to tackle climate change and it recognizes that our climate is affected by anthropogenic emissions of Greenhouse Gases (GHGs). The Convention seeks "stabilization of GHG concentrations…at a level that would prevent dangerous anthropogenic interference with the climate system" (Article 2), and its Parties (the signatory countries) are expected to "take precautionary measures to anticipate, prevent or minimize the causes of climate change and mitigate its adverse effects" (Article 3). The UNFCCC also recognizes that the Parties have "common but differentiated responsibilities" based on their national circumstances.

The Parties to the convention are divided into different groups called "Annexes". Annex I consists of

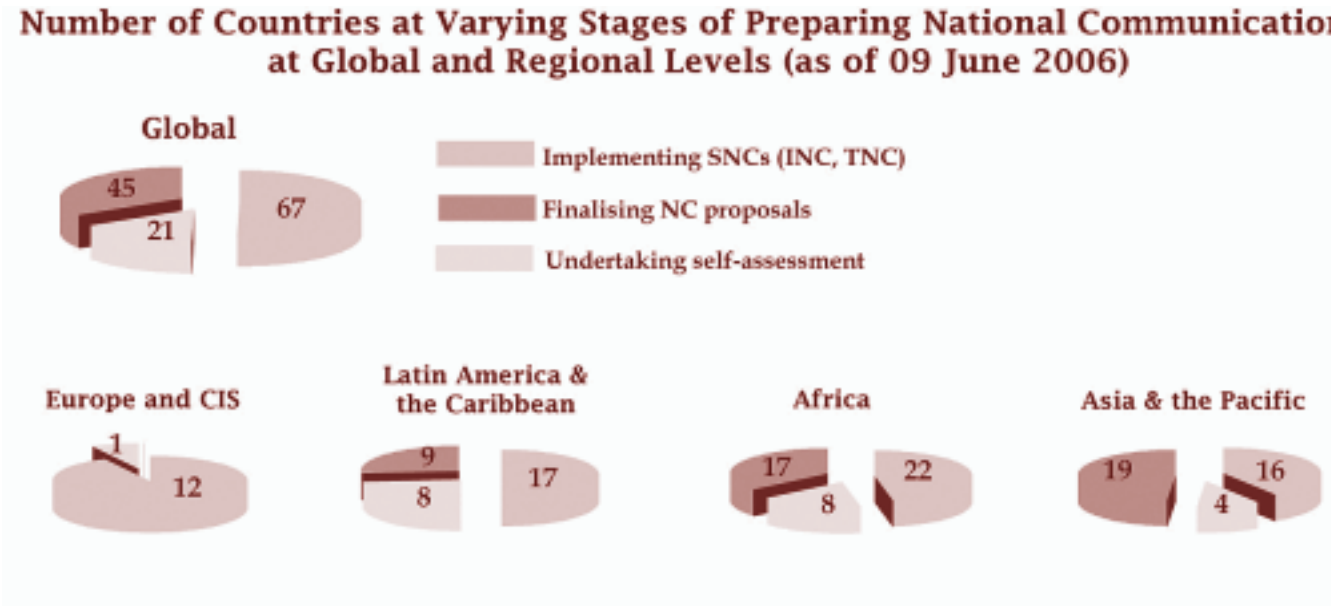


Figure1: Current Status of National Communications Preparation (June 2006)

Photo: Charlie Heaps, SEI

Trainees in the LEAP Workshop in Cairo, Egypt, 2006.

members of the OECD nations in 1992 plus the economies in transition (EIT). Annex II consists of the OECD members of Annex I. Annex II Parties are required to provide financial resources to enable developing countries to undertake emissions reduction activities and to help them adapt to adverse effects of climate change. Non-Annex I (NAI) Parties are mostly developing countries. Certain countries are recognized as being especially vulnerable to climate change, while others are more vulnerable to the potential economic impacts of climate change responses (e.g. fossil fuel exporting nations).

The 48 least developed countries (LDCs), are given special consideration under the Convention on account of their limited capacity to respond to climate change and adapt to its adverse effects.

All Parties are expected to submit reports called "National Communications" that contain:

- A national inventory of anthropogenic emissions by sources and removals by sinks of all GHGs not controlled by the Montreal Protocol.
- A general description of steps taken or envisaged by the non-Annex I Party to implement the Convention.
- Other information that Parties consider relevant including, if feasible, material relevant for calculations of global emission trends.

These national communications have become an important tool for bringing climate change concerns to the attention of policy makers at the national level. By July 2005, initial national communications (INCs) had been presented 125 NAI Parties, and second national communications had been presented by 3 NAI Parties. In the next phase of the Convention in which the focus is increasingly on implementation, national communications will become an important strategic tool to help countries align their interests and priorities to the overall goals of the Convention.

Figure 1 shows the current status of

national communications preparation by Parties in different regions of the World.

The next round of national communications is expected to improve on the initial round. In a report to the UNFCCC in 2001, the Convention's Consultative Group of Experts (CGE) noted that many NAI Parties had not been able to comprehensively assess GHG abatement options, their reduction potential, and costs and benefits. The CGE also noted that INCs used different approaches that often were not comparable. Thus in 2002, a new set of guidelines were adopted to assist developing country Parties in preparing their second and subsequent national communications.

The CGE has also recently developed a new set of materials for use in a Global Hands-on Training Workshop designed to assist NAI experts in preparing the mitigation section of their national communications through training on a wide range of mitigation assessment approaches, methods and tools. The first Global Hands-on Training Workshop was held in the Seoul, in the Republic of Korea in September 2005.

All the training materials from that workshop are currently available for download from the UNFCCC web site: http://unfccc.int/resource/cd_roms/na1/mitigation/index.htm

THE NATIONAL COMMUNICATIONS SUPPORT PROGRAMME

Launched in June 2005, the National Communications Support Programme (NCSP) is funded by the Global Environment Facility (GEF) to provide technical assistance to developing countries for preparing their Second National Communications (SNCs). The NCSP is implemented by the United Nations Development Programme (UNDP) in collaboration with the United Nations Environment Programme (UNEP), and hosted at the UNDP headquarters in New York, and it works closely with the secretariat of the UNFCCC based in Bonn, Germany.

The NCSP aims to enhance capacity in non-Annex I Parties through the provision and delivery of an integrated package of technical and policy support services. Learning from past experience, the NCSP aims to customize its technical assistance to better meet the needs of countries. For example, rather than hold generic regional workshops, it intends to provide targeted, in-depth and issue-specific workshops at the sub-regional level.

The NCSP web site is: http://ncsp.undp.org

NCSP WORKSHOPS ON CLIMATE CHANGE MITIGATION

One of the first examples of this targeted approach, was the recent training workshop on using the Long-range Energy Alternative Planning (LEAP) for climate change mitigation, which took place in Cairo, Egypt, between 3-7 April 2006. The workshop was organized in response to requests from NAI country experts and national communications project co-ordinators. A total of 33 participants from 19 NAI Parties attended.

The Workshop highlighted good practices and lessons learnt on conducting mitigation analyses during the preparation of Initial National Communications (INCs). Broad guidance on reporting mitigation measures under the UNFCCC, and generic methods and tools for mitigation analysis were also introduced. Most of the workshop was devoted to dedicated hands-on sessions where participants analyzed mitigation options within the energy sector, using LEAP.

The Workshop was a great success and participants were satisfied with the overall approach, structure, and content of the Workshop. In addition to the excellent logistic support from the Egyptian host and the financial contribution from the USEPA, the diligence and enthusiasm of the participants were crucial to the success of the event. On ways to improve training courses such as this one, participants suggested longer duration for the workshop to allow the use of country-specific data. In addition, they also expressed interest in training courses on other tools for mitigation analysis in agriculture and land-use, land-use change and forestry sectors.

The workshop report is available here: http://ncsp.undp.org/workshops.asp

PLANS FOR FUTURE WORKSHOPS

Based on request from countries, the NCSP is planning to organize additional training workshops on mitigation analysis and on developing mitigation projects from information generated from the National Communications. A second LEAP workshop is tentatively planned for late 2006. Once a date and venue have been confirmed it will be announced on the NCSP and COMMEND web sites.

For more information:
Please contact: Dr Xianfu Lu, Technical Specialist, National Communications Support Programme (NCSP), UNDP-GEF;
Email: xianfu.lu@undp.org

Photo: Yves Beaulieu – IDRC

WHAT'S NEW LEAP 2006

APPLICATION PROGRAMMING INTERFACE (API)

LEAP has a new Application Programming Interface (API) that allows many standard programs, and any Windows-based programming language to control LEAP directly: for example allowing other programs to read or change data values in LEAP, calculate results, or export data and results to Excel and other applications.

The API allows LEAP to be used as a building block for constructing broader software applications that go beyond LEAP's own energy and environment simulation and accounting capabilities. In this way, LEAP's basic accounting calculations can be coupled with other models such as goal-seeking or optimizing tools. LOpt (described elsewhere in this newsletter) is the first example of an application that takes advantage of this capability.

LEAP also now has its own built-in script editor that can be used to edit, debug and run scripts that automate LEAP using the API. LEAP supports scripts written in both Visual Basic and JavaScript (See Figure 1).

RESERVE MARGIN CALCULATIONS

In previous versions, LEAP would automatically add capacity to maintain a user-defined planning reserve margin, which was set for each Transformation module. If you set this value too low, the module would not be able to fully meet peak power requirements. Conversely, if you set it too high then LEAP would build more capacity than was actually required to meet the peak.

In the new version of LEAP, you can now opt to have LEAP calculate and set the required planning reserve margin endogenously so that it builds sufficient but not excessive capacity to meet the peak power requirements. Required reserve margin is calculated based on the system peak load, and the percent availability of the power plants in the system.

Figure 1: The Script Editing Tool in LEAP

OTHER NEW FEATURES

Other changes worth noting in the new version include:

- Improved Results Reporting: Data variables can now be accessed in the Results View alongside results variables, while the Overviews screen now allows you to display results in both chart and table format (See Figure 2).
- Better Data Editing: LEAP now supports concurrent editing of a variable across all scenarios or all regions.
- Faster Calculations: The new version provides for significantly faster calculations. On larger data sets, calculation times are reduced by 30-40%.

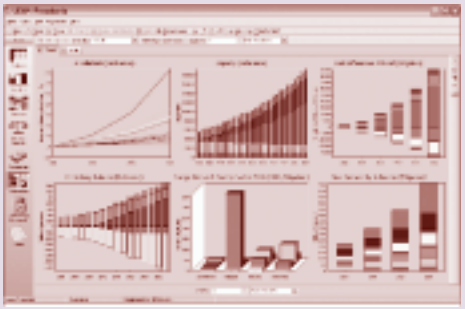
DEVELOPMENT PLANS FOR 2006

We will be continuing to develop LEAP in 2006. Development priorities are established based on the feedback and feature requests we get from users, so please contact us and let us know what you need.

Developments happening in 2006 include the creation of better national baseline datasets as a way of "jumpstarting" LEAP analyses, and improvements to LEAP's energy import and export calculations to better support analysis of regional energy trading.

You can download the latest version from the COMMEND web site: www.energycommunity.org

Figure 2: The Overviews Screen in LEAP



For more information:

Please contact: Charlie Heaps, LEAP developer, Stockholm Environment Institute Medford, MA, USA;
Email: charlie.heaps@sei-us.org