



**REGIONAL WOOD ENERGY DEVELOPMENT PROGRAMME IN ASIA  
GCP/RAS/154/NET**



**SECOND REGIONAL ADVISORY  
COMMITTEE MEETING**

**BANGKOK, THAILAND**

2 - 5 September 1997



**FOOD AND AGRICULTURE ORGANIZATION OF THE UNITED NATIONS  
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## FOREWORD

Two and a half years after its previous meeting, RWEDP's Regional Advisory Committee met again. All 16 member-countries were represented, with delegates from both the forestry sector and the energy sector. Together with experts from FAO and other specialised organisations, the delegates reviewed RWEDP's achievements so far and discussed the strategies for further wood energy development. The meetings were also attended by representatives from the Government of the Netherlands, the Programme's donor agency, and the Government of Thailand, the Programme's host country, as well as the members of the tripartite evaluation team of the Programme.

The meeting took place in an excellent atmosphere and provided valuable strategic advice for RWEDP in the coming years.

In his inaugural address Dr Soetatwo Hadiwigeno, Regional Representative for Asia and the Pacific and Assistant Director General (ADG) of the FAO, stressed the importance of wood energy in the region, and noted that an ever increasing number of people depend on it for their daily needs. The ADG highlighted the continued existence of problems related to the use of wood energy, especially the burden woodfuel use lays on women and children. Dr Soetatwo underlined the importance of the efforts of policy makers in the forestry and energy sectors to address wood energy development issues.

The Committee unanimously took the view that problems of wood energy development still persist, in spite of the ongoing national and international initiatives for improvement of wood energy production and utilisation systems. The catalytic role played by RWEDP was noted with satisfaction. It was recommended that RWEDP should go full speed ahead in the remaining project period. The Committee provided specific advice for the development of policies and institutions, human resources, and databases, information and networking, all with respect to wood energy. Furthermore, recommendations were made to continue assisting countries in their wood energy development efforts after termination of the present RWEDP.

It could be observed that all delegates in the meeting more or less spoke a 'common language'. There was a general consensus on the formulation of wood energy problems with acknowledgement of different national priorities, and a common perception of the direction in which solutions lay. Furthermore, there was a common will to intensify joint efforts to implement these solutions.

Dr.W.S. Hulscher  
Chief Technical Adviser  
FAO/RWEDP

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## LIST OF ABBREVIATIONS

ADB	Asian Development Bank
ADG	Assistant Director General
AEEMTRC	ASEAN-EC Energy Management Training and Research Centre
AIT	Asian Institute of Technology
APAN	Asia-Pacific Agroforestry Network
APDC	Asia and Pacific Development Centre
APERC	Asia Pacific Energy Research Centre
APO	Associate Professional Officer
ARECOP	Asia Regional Cookstove Programme
ASARDL	Alternative Socio-economic Approaches to Reclaiming Degraded Lands
ASEAN	Association of South East Asian Nations
CAEERP	Chinese Academy of Agricultural Engineering Research and Planning
CEB	Ceylon Electricity Board
CEERD	Centre for Energy – Environment Research and Development
CHP	Combined Heat and Power
CO <sub>2</sub>	Carbon Dioxide
COGEN	EC-ASEAN Cogen Programme
CPC	Ceylon Petroleum Corporation
CTA	Chief Technical Advisor
DEPE	Department of Environmental Protection and Energy
DOE	Department Of Energy
DOP	Department Of Planning
DRR	Deputy Regional Representative
EC	European Community
ECF	Energy Conservation Fund
EDC	Electricity De Cambodge
EJ	Exa Joule
ENDA	Energy Network Development Assistance
EREC	Energy efficient and Renewable Energy Clearinghouse
ESCAP	Economic and Social Commission for Asia and the Pacific – UN
ESMAP	Energy Sector Management Assistance Program
EUROSTAT	Statistical Organization of the European Union
FAO	Food and Agricultural Organization of the United Nations
FAO-RAP	Food and Agricultural Organization, Regional Office for Asia and the Pacific
FD	Forest Department
FNCRDC	Forest Nature Conservation Research and Development Centre
GDP	Gross Domestic Product
GJ	Giga Joule
GNP	Gross National Product
GO	Governmental Organization
HESS	Household Energy Strategy Study
HRD	Human Resources Development
IC	Improved Cookstove
IEA	International Energy Agency
IIEEP	Institute of Energy and Environmental Protection



IGNFA	Indira Ghandi National Forestry Academy
IGF	Inspector General of Forests
IRED	Integrated Rural Energy Development
Lao PDR	Lao
LEAP	Long-range Energy Alternatives Planning – Model
LNV	Ministerie van Landbouw Natuurbeheer en Viserij
LPG	Liquefied Petroleum Gas
MIME	Ministry of Industries, Mines and Energy
MNES	Ministry of Non-conventional Energy Sources
MOA	Ministry of Agriculture
MOF	Ministry Of Forestry
MOFA	Ministry Of Fisheries and Agriculture
Mtoe	Million Tons Oil Equivalent
MW	Mega Watt
NAC	National Advisory Committee
NCED	Non-Conventional Energy Department
NEC	National Energy Centre
NGO	Non Governmental Organization
NRES	New and Renewable Energy Sources
NWEWG	National Wood Energy Working Group
NWG	National Working Group
PFI	Pakistan Forest Institute
PRA	Participatory Rural Appraisal
PRODOC	Project Document of RWEDP
R and D	Research and Development
RAC	Regional Advisory Committee
RAP	Regional Office for Asia and the Pacific
RDA	Rural Development Academy
RE	Renewable Energy
RFD	Royal Forest Department of Thailand
RITF	Research Institute of Tropical Forestry
RWEDP	Regional Wood Energy Development Programme in Asia
SEI	Stockholm Environment Institute
SERD	School of Environment, Resources and Development
SPC	State Planning Commission
TFSMP	Thai Forestry Sector Master Plan (draft)
TOR	Terms of Reference
UN	United Nations
UNDP	United Nations Development Programme
UNESCO	United Nations Educational Scientific and Cultural Organization
UPLB	University of the Philippines-Los Banos
WB	World Bank
WEC	World Energy Council
WECS	Wood Energy Conservation Specialist
WED	Wood Energy Development
WEPS	Wood Energy Planning Specialist
WERS	Wood Energy Resources Specialist
WETT	Wood Energy Today and Tomorrow
WRI	World Resources Institute

# 1. INTRODUCTION

The second meeting of RWEDP's Regional Advisory Committee took place at the end of three years of operations of the present phase of RWEDP (2–5 September 1997). The meeting provided an excellent opportunity to discuss the experiences of the past three years and look ahead at the coming two years, and beyond. The participants were delegates from the Focal Point agencies in the 16 member-countries as well as representatives from FAO headquarters, FAO Regional Office in Asia and the Pacific, the government of the Netherlands and its embassy in Bangkok, several specialised institutes in the region, the CTA and staff of RWEDP. The meeting was also attended by the team evaluating RWEDP after its first three years of operation. A complete list of the participants of the meeting is included in appendix 1.1 and a detailed programme of the meeting in appendix 1.2.

The general objective of the meeting was to contribute to the development and implementation of improved wood energy policies, plans and strategies in member countries. The immediate objectives of the meeting were threefold:

- a. to review current policies and programmes for wood energy development in RWEDP member-countries;
- b. to provide strategic advice on priorities for RWEDP's workplans and implementation at the regional level; and
- c. to discuss priorities and options for wood energy development programmes after termination of RWEDP.

## 1.1 Opening of the Meeting

Mr Sathit Sawintara, Director General, Royal Forest Department Thailand, welcomed the delegates on behalf of the host government. He pointed out that Thailand is keen to collaborate with the countries in the region and share the knowledge and experience acquired by each country in the area of wood energy development. The Director General of the RFD cited the following specific benefits from the collaboration with RWEDP for Thailand. First of all, Thai professionals' knowledge and skills of policy formulation, programme planning and programme implementation related to wood energy issues have been enhanced. Secondly, co-ordination and linkages have been established by RWEDP not only between the organizations within the forestry sector, but also between the forestry and energy or power sectors concerned. Now the two sectoral agencies in Thailand are fully aware of the problems and potentials of area based integrated rural energy development. Therefore, Thailand has very positive feelings and continued interest in participating in the coming two years.

The complete text of the Welcome Address appears in appendix 1.3.

The meeting was officially inaugurated by Dr Soetatwo Hadiwigeno, Regional Representative for Asia and the Pacific and Assistant Director General of FAO. Dr Hadiwigeno extended FAO-RAP's warm welcome to the participants. He highlighted the development objective of RWEDP and stressed the importance of wood energy in the countries in the region. According to the ADG, woodfuels are often seen as a by-product of forests and other tree product systems, rather than as a main product. But still numerous people in the region depend on wood for their daily needs and their numbers will increase. In his address he stressed that there are still a lot of problems related to the use of wood energy, like the burden wood energy use places on women and children. According to Dr S. Hadiwigeno, all these problems underline the

importance of the efforts of policy makers in the forestry and energy sector to pay extra attention to wood energy development. Further, he addressed the important environmental aspects of woodfuel use and production. Uninformed outsiders still look at woodfuel use as a major threat to natural forests or even as a main cause of deforestation. Thanks to RWEDP and others it is now clear that this concept is false. In fact almost all wood energy use is on a sustainable basis. The second environmental aspect of wood energy use addressed by Dr S. Hadiwigeno is related to the CO<sub>2</sub> problem. The sustainable use of wood energy implies that whatever CO<sub>2</sub> is emitted by using wood as a fuel is recaptured from the atmosphere by regrowth of trees and other vegetation. Therefore, such use of woodfuels has theoretically no net effect on the contribution of greenhouse gases to global warming. At the end of his statement the ADG expressed his confidence that, with all the experience gathered at the RAC meeting, RWEDP will be in a good position to carry on with the same vigour as it has done so far.

The full text of Dr Hadiwigeno's Inaugural Speech is given in appendix 1.4

On behalf of the Assistant Director of the Forestry Department, FAO Headquarters, a statement was presented by Mr Miguel Trossero, FAO Senior Forestry Officer. Mr Trossero highlighted that energy remains a hot issue in the region and the demand for fuels is growing continuously. Wood energy is and will remain the most important source for energy for traditional use and more and more also for modern applications. Mr Trossero stated that we are entering the 'Wood Energy Revival Phase' More and more policy makers and private organizations are becoming attracted to wood energy as an environmentally friendly 'green' source of energy, both in developed and developing countries. Several 'Wood Energy for Today and Tomorrow' studies show that similar wood energy situations are found in both the developed and the developing countries. The biggest problem for implementation of projects in the field of wood energy is the lack of data. The FAO-Headquarters is now focusing on this.

In his statement, the FAO senior forestry officer highlighted several special issues and events which have occurred since the first RAC Meeting, such as the incorporation of Cambodia as the 16<sup>th</sup> RWEDP member country, the huge efforts of RWEDP to incorporate wood energy issues into national policies strategies and programmes in the forestry and energy sectors, and the attention paid to gender issues by RWEDP. According to Mr Trossero, the project is gaining a new momentum, which will enable the successful implementation of new approaches and strategic lines of action for the next two years.

A full copy of the Statement is in appendix 1.5

Mr Rienk Wiersma, Head of the Development Cooperation Section, Royal Netherlands Embassy in Bangkok, expressed his appreciation for the efforts of FAO jointly with member-countries in Asia for the development of wood energy. Mr. Wiersma underlined the importance of the subject in relationship to people's needs as well as for the healthy state of countries' natural resources. Wood energy supply and use remains a key issue for development on a long-term basis in this part of the world. Strengthening of capacities and skill enhancement are essential. The representative of the Dutch Embassy extended a special welcome to the delegates from Cambodia as a new member-country of RWEDP, and expressed his confidence that the regional project will assist the country to sustainably utilise its forest and tree resources.

A statement on behalf of the Dutch Government was read by Ms Hanneke van Toorn (Environment Department, Climate, Energy and Environmental Technology Division, Ministry of Foreign Affairs) The starting point of the Dutch government's developing policy is to stimulate sustainable development. With respect to energy, the Netherlands are of the opinion that new

energy strategies are needed which are based on the rational use of energy and the development of renewable energy. For this goal, a transition to sustainable energy systems and services is needed. In Asian countries wood energy is one of the most important renewable energy sources (although the potential is often underestimated and misconceptions hamper the development of biomass energy). The Dutch Government is of the opinion that biomass has to be part of energy development policies, and that substantial progress has to be made in addressing and developing the instruments to efficiently produce, manage and utilize wood fuels for the benefit of households, industries and other enterprises. RWEDP is seen as an important program in achieving these two targets. In 1999 RWEDP will terminate, therefore, the RAC-meeting should, according to Ms Van Toorn, also discuss which steps have to be taken to make sure that the participating countries can be self-sustaining in the development and implementation of wood energy policies and strategies.

The complete text of the Statement is in appendix 1.6.

Finally, Dr, Willem Hulscher, Chief Technical Advisor of RWEDP, expressed his deep gratitude to all organizations and individuals who made the organization of the second Regional Advisory Committee Meeting possible. He also extended his welcome to all the delegates and expressed his hope for a successful meeting.

The full text of the Vote of Thanks is in appendix 1.7

## **1.2 Presentation on RWEDP**

After the opening session, Dr W. Hulscher, as Chief Technical Advisor of RWEDP, presented a report on RWEDP. He discussed the main achievements of RWEDP so far. Achievements in the three major expert fields of RWEDP: Wood Energy Conservation, Wood Energy Resources and Wood Energy Data and Planning, were discussed in more detail. Dr Hulscher presented the outline of the workplan for the remaining project period. The aim of the remaining period is to complete the planned activities, so as to consolidate current impacts. Further, the project activities in the remaining project period were discussed. Finally, the question of 'what to do after RWEDP terminates its work in 1999' was raised. (See Chapter 2)

## **1.3 Country Presentations**

The first session of the meeting consisted of country presentations. Each country was given fifteen minutes to address three topics according to guidelines issued in advance to the country's focal point (see appendix 1.9). The three topics and the related guidelines were as follows:

### *1. National policies for wood energy*

Please identify recent developments in:

- main policies and legislation regarding wood energy production and use;
- current arrangements and institutional strengths and weaknesses in the country regarding wood energy production and use;
- the position of wood energy in the country's energy planning;
- priorities of the Focal Points and/or National Advisory Committee for RWEDP; and
- activities of National Wood Energy Working Groups.

## *2. Experiences so far and problems encountered*

Please identify:

- advances which have been made in wood energy development and how they have been made;
- the current main wood energy problems in the country;
- the major constraints to wood energy resource development, conservation and planning in the country; and
- other relevant constraints.

## *3. Advice to RWEDP*

Please state:

- priorities for further RWEDP assistance and co-operation;
- observations on training in wood energy relevant for further activities;
- ways of further strengthening wood energy data collection and analysis; and
- priorities for follow-up after termination of RWEDP.

Summaries of the Country Papers are presented in Chapter 3 of this report

## **1.4 Presentations on Sustainable Strategies for Wood Energy Development**

The second session of the meeting consisted of three presentations on Sustainable Strategies for Wood Energy Development. The papers presented by RWEDP's specialists were as follows:

Mr Tara N. Bhattarai, Wood Energy Resources Specialist of RWEDP gave a presentation on Wood Energy Resources. Points which came up for discussion were:

- the wood energy resource base;
- regional/sub-regional/national-level activities in the field of wood energy resources;
- potential areas for further collaboration with institutions in the region; and
- commonly observed issues and constraints in wood energy resource development.

See chapter 4 for the complete presentation on wood energy resources.

Mr Conrado S. Heruela, Wood Energy Planning Specialist of RWEDP gave a presentation on Wood Energy Data and Planning Issues. Issues which came up for discussion were:

- wood energy data collection;
- wood energy planning; and
- strategic issues on building national capacities for wood energy planning.

The complete presentation on wood energy data and planning issues will be found in chapter 5.

Mr Auke Koopmans, Wood Energy Conservation Specialist of RWEDP gave a presentation on Issues and Options for Wood Energy Conservation Activities. The following points came up for discussion:

- biomass energy applications;
- biomass energy shares;
- support required for wood energy conservation; and
- RWEDP's wood energy conservation activities in the remaining period.

See chapter 6 for the complete presentation on wood energy conservation issues.

## **1.5 Discussion Groups**

The third, and last, session of the meeting consisted of group workshops. These group discussions culminated in a plenary session where the results and recommendations of the group discussions were presented. Before the group discussions started, a profile of the ASEAN-EC Research Management and Training Centre (AEEMTRC) was presented by the director, Dr Hasan Ibrahim (the AEEMTRC profile is in appendix 1.8).

The participants were divided into three groups and were asked to give recommendations in the following areas:

- development of policies and institutions;
- human resources development; and
- development of databases, information and networking.

These areas were chosen by RWEDP, based on their perception of the most important/difficult issues in wood energy development at the moment.

During the plenary session, the group members discussed their conclusions and recommendations. The session was closed by Dr W. Hulscher. Reports of the discussion group are included in chapter 7. The conclusions and main recommendations of the complete meeting are listed in chapter 8.

## **1.6 Field Trip**

After the closing session of the RAC meeting, the participants visited the Lad-Krating tree plantation of the Thai Plywood Company and nearby charcoal production sites in Chacheangsao province. Waste wood of the plywood factory (i.e. branches and stems under a certain diameter and under a certain quality) are used as raw material for the charcoal factory.

The visit was arranged by Mr Pralong Dumrongthai from the Wood Energy Research Division, of the Royal Forest Department, Thailand.

## **2. REPORT ON RWEDP**

*Dr W. S. Hulscher, Chief Technical Advisor, RWEDP*

### **2.1 Introduction**

The report on RWEDP by the CTA aimed to serve as an input for the discussions, and was followed up by presentations on the three wood energy specialisms by RWEDP experts.

### **2.2 Summary of Achievements**

#### **2.2.1 Assets**

The present phase of RWEDP builds on the achievements of the two previous phases, which are important assets in terms of their legacy of concepts and information on wood energy in Asia. The previous phases have also generated a lot of goodwill in the region though, unfortunately, a great deal of momentum was lost by the one year gap between the third and the second phases.

The expertise from the past is particularly notable in the Project Document (PRODOC) -- the document containing the proposal for setting up the RWEDP -- and the contribution of this expertise to the main fields in which the RWEDP operates is an obvious asset. The PRODOC is something of an asset too in that its very specific and clearly stated project objectives continue to offer helpful guidelines for operations during this third phase. The PRODOC also balances the various important aspects of wood energy development in such a way that a synergy of different approaches and activities is encouraged. Further assets of the present phase of RWEDP are the time span of five years, an adequate budget, and experienced staff who are keen to work as a team. Finally, being located in Bangkok is a definite asset. Its well developed infrastructure, and the availability of FAO-RAP facilities nearby ensures that there is a highly supportive physical work environment.

#### **2.2.2 Main achievements**

##### *General*

The most tangible results of the past three years are the implementation of 37 workshops (group activities) which have served 1,100 staff from member-countries with training in aspects of wood energy development; the publication of 13 wood energy reports, each one distributed to some 150 institutions in the region; and the publication of 8 issues of Wood Energy News, each one distributed to more than 3,000 institutions. However, these facts do not reveal the qualitative aspects of RWEDP's achievements, which may be more important than the numbers.

Bringing together expertise from the forestry and energy sectors, along with staff from both, is a stated aim which has proved to really 'work'. The two professional groups would otherwise seldom interact, even though they are both supposed to be involved in wood energy and can learn from each other. For example, it was clear that for the foresters being trained in a national workshop in Thailand, the contributions from Thai energy people provided an eye-opener. What also works is the trickling down from regional activities to national activities. At the regional level concepts have been developed by RWEDP and other experts, which do provide a valuable basis for national

workshops etc. In all member countries except Bhutan, Lao PDR and Maldives, one or more group-activities (regional or national workshops, etc.) have been implemented. It is believed that the strategy of spreading group-activities over various member-countries adds to the momentum generated.

It is also obvious that there was, and still is, a real need to address the serious misconceptions about wood energy in the region (as well as outside the region). The present phase of RWEDP has reformulated, amplified and widely communicated important findings of the previous phases (e.g. wood energy is not phasing out; most of the woodfuels do not originate from forests; woodfuel generates 20 times more local employment than oil products, etc.). Basically, these findings were all available in the 'Chiangmai papers' of 1993 (RWEDP Field Documents 57 a,b,c), but only few insiders appear to have absorbed them. The present phase of RWEDP has not only amplified and communicated this important information, but also drawn stronger policy conclusions from it. For instance, that the total economic value of woodfuels is to be counted in billions of dollars, that most of the woodfuel is consumed on a sustainable basis which does not cause a threat to the local environment, and that woodfuel use is benign for the global environment. These conceptual issues are time and again communicated in RWEDP's publications and meetings.

### *Conservation*

In the field of wood energy conservation, new issues have been put on the agenda: stoves for loose residues as a fuel; institutional stoves; stoves for space heating; and health aspects of stoves, particularly from a gender perspective. These issues are important but had not up until now been addressed, or at least not adequately, either within RWEDP or outside. The same applies to the essential linkages between stoves and kitchen design, which have been taken up by RWEDP in co-operation with others. Other main achievements in the stoves field are the fruitful interactions secured between the government and non-government sectors. Both learned from each other (which neither usually likes to admit) and sustainable interactions have been established. Essential contributions from the private sector have also been acquired.

Stove issues have very much a social aspect which are most important for improving the quality of life for poor people. Advice from RWEDP on improved stoves is frequently sought by third parties and, of course, provided to them.

The scope for modern industrial applications of wood and biomass energy has been communicated to selected experts from member-countries. RWEDP anticipates that developments in this area will accelerate and attaches particular importance to it. Also, due attention has been given to traditional wood energy users in the commercial and industrial sectors. This will lead to further documentation and dissemination of information.

### *Resources*

In the wood energy resource development field, operational concepts of incorporating woodfuels in multiple-purpose tree production and farming systems have been identified, developed and presented. It seems they are well received by both the converted and the established foresters. Most importantly, various options have been put in perspective, avoiding over-advocating one particular approach as is being done too often elsewhere. RWEDP is aware that woodfuels basically serve as a by-product only (whether this is justified or not), and that this situation has important implications for wood energy resource development. The concepts and relevant case studies have been published in a series of RWEDP documents and are thus widely available for



future use in member-countries. Increased awareness and appreciation of fuelwood as an important product from trees and forests can now be observed.

Generally, institutes for education and training of foresters in the region appear to pay no attention to fuelwood issues at all. This also applies to some of the most reputed institutes such as IGNFA, PFI, UPLB. The situation is now being redressed through advice and support from RWEDP. Region-wide follow-up initiatives, i.e. advice and support from RWEDP, expert consultation on the subject, are being prepared, so as to ensure relevant wood energy subjects are included in foresters' curricula.

Between the resources and use of woodfuels, the distribution and trade (or flow) of woodfuels plays an important role. This essential link is often not recognized by experts at both ends. The present phase of RWEDP has built on the results of studies on wood fuel flow, conducted during the previous phase, and developed relevant national training packages for member countries. Additional case studies have been and are being undertaken. One important objective of these is to illustrate the important gender aspects of woodfuel flows.

### *Data and Planning*

A compilation of selected wood energy data has been published in Wood Energy News, which was very much appreciated by many people. A comprehensive set of 'best available' wood energy data is contained in the RWEDP study 'Wood Energy Today for Tomorrow' (publication date, October 1997). RWEDP's selection and analysis of these data may upset established international institutions which also publish wood/biomass data, but often on a shaky basis. RWEDP is prepared to face the discussions to come.

Substantial efforts have been made to develop training concepts and materials on wood energy data collection, analysis, and planning. Though the work is not yet final, it already provides a solid basis for training within and beyond RWEDP. Along with this work, major efforts have been made to build up expertise on wood energy planning in the co-operating regional training institutes, so as to enhance the chances of sustainability after termination of RWEDP.

Supporting the efforts in wood energy planning is the familiarization of member-countries with the computer programme LEAP, which has been made available to relevant government departments. The real-life case study applying LEAP to a district in Thailand, is probably the first one ever, and it has been widely distributed as a model for others in the region. Staff from various member-countries have received tailor-made training from RWEDP, in order to prepare for area-based case studies in their home countries. Related to this, guidelines for developing a wood energy data base have been made available to interested parties, and RWEDP is now in the process of developing a comprehensive wood energy data base system.

### *Policies*

With regard to wood energy policies, concepts have been presented not only in publications but also in various bilateral and multilateral settings. The mainstream energy policy scene was targeted e.g. via the ASEAN platform, the Asian Development Bank (ADB), and the two major International Conferences of the World Energy Council (WEC) in Asia. Overall, progress is being observed in member-countries with regard to integrating wood energy into broader energy frameworks.

With regard to forest policies, a substantial document on 'Wood Energy Today for Tomorrow' has been prepared by RWEDP, for the Asia-Pacific Forestry Commission. In addition to forest policy, it

also contains major policy issues on energy and the environment. Another significant output is the work on 'Woodfuel scenario and policy issues in India' which is to serve as briefing material for in-service training of all senior administrators in India.

### *Gender Concepts*

Last but not least, concepts of gender and wood energy have been developed, and integrated into virtually all group activities of RWEDP. This has also resulted in three special group-activities on these issues. The work can be considered innovative (credit goes to RWEDP's advisors) and has been acknowledged in a special issue of the new international periodical 'ENERGIA' which focuses on women and energy. A start has been made with developing specific modules on gender and wood energy, as well as with making wood energy data bases gender sensitive.

### **2.2.3 Main constraints**

The essential characteristics of wood energy are the dispersed and small-scale nature of its supply and use, with poor and marginalized people being the main dependants. These characteristics offer little visibility or glamour to metropolitan decision makers. The situation implies inadequate appreciation for wood energy amongst the centres of political power in the region, in spite of the proven social, economic and environmental importance of the fuels. In a way, this situation underlies the rationale for the very existence of RWEDP and provides a challenge to the project.

In facing the challenge, there are various kinds constraints on RWEDP. A major constraint is the general lack of regional institutions which are competent to take up training and research in aspects of wood energy development. As a result, RWEDP has to direct a very large part of its time not only to develop the training concepts, but also to implement them, or at least to closely assist others in implementing them. The same applies to the concepts and methods for research and case studies.

The above constraints are particularly felt because RWEDP has made the choice to work primarily with and through institutions and individuals within the region, rather than with consultants or well-established institutes from outside the region. The choice has been made in order to enhance the chances of sustainability of wood energy development after termination of RWEDP.

Further constraints are probably not unique to RWEDP. They are, for example, the high turn-over of leading and also middle-level government staff, administrative procedures which tend to unnecessarily delay project implementation, and the sometimes unrealistic expectations with regard to a UN agency, as well as language barriers.

## **2.3 Outline of Workplan, September 1997–1999**

### **2.3.1 Aims for the remaining project period**

The main aim for the remaining project period is to complete the planned activities so as to consolidate current impacts. It is anticipated that this will strengthen the momentum being built up in relevant departments in member countries. The skills being developed by country staff may then have sustainable impacts. However, some adjustment regarding the number of planned group activities may be necessary in order to maintain quality and impact. A further aim being considered is to prepare a standardized text-book on wood energy.

Another prime objective is to strengthen wood energy data collection and provide updated overviews as far as possible. RWEDP's future efforts will be placed in the context of the new and upcoming activities of other international organizations dealing with wood energy data. Consultations have started on how to best co-operate with these organizations.

Further, it is aimed to strengthen RWEDP's impacts on the higher policy levels of member countries. At this point, the directions and country-specific issues have become sufficiently clear to specifically address the top policy makers. It is also intended to convey relevant messages to departments with responsibilities for agriculture and for the environment.

Some follow-up project proposals related to wood energy are being prepared and efforts will be made to raise donor interest in them. Priority countries for RWEDP are in the Mekong River Basin area. Also, RWEDP will try to ensure that its 'heritage' of some 15 years wood energy development in the region, will be transferred in an optimal way. This heritage includes, e.g. a library, periodicals, expertise, references, ideas and goodwill. Various modalities for accomplishing the transfer of this are possible.

### **2.3.2 Activities in the remaining project period**

#### *Scope*

Immediate Objectives, Outputs and Activities of RWEDP have been formulated in the Project Document for the total project period, 1994–1999. On an annual basis, RWEDP submits its workplan to FAO and member-countries. Reference is made to the Workplans for 1995, 1996, and 1997 for activities completed so far. For the remaining project period, 1998-99, RWEDP plans to complete the activities as formulated in the Project Document. However, some modifications are proposed, based on experiences gained so far, and in the context of changing conditions and observed needs of member-countries. The following are the main issues.

#### *Group Activities*

The remaining group activities will be completed according to the Project Document (see overview table in Appendix 2.1), however the following modifications will be made:

- Regional workshops on industries (Act. 3.5.6.) will be changed into expert consultations, with emphasis on documentation/manual production.
- Some national seminars on planning, policies and strategies (Act. 2.4.5.) will be changed to selected area-based case studies, and applications of LEAP for integrating wood into energy analysis.
- A regional expert consultation on wood energy in forestry education will be added to the list of activities.

#### *Data and Planning (selected items)*

- A wood energy database system will be completed, and available data entered.
- National data will be collected, analysed and compiled.
- Selected case studies in area-based planning will be conducted.
- Case studies on wood fuel productivity of various land-use types will be initiated.
- Broad guidelines to sustain capacity building in data collection and planning will be developed.

### *Resources (selected items)*

- A review of existing forestry training curricula in selected member countries will be completed and results will be discussed on a regional platform to design future strategy for its integration.
- Commercially viable cases of fuelwood plantations will be identified, analysed and documented.
- Support to woodfuel flow studies will be provided, perhaps with an emphasis on gender aspects.

### *Conservation (selected items)*

- Wood energy in traditional industries will be further analysed and documented.
- In household energy, efforts will be directed to training of trainers.
- The role of residues for fuel will be further analysed and documented.

### *Gender (selected items)*

- Training modules on gender and wood energy for third parties will be completed and distributed.
- Local groups and NGOs will be activated and briefed on gender and wood energy.
- Selected case studies on gender and wood energy will be initiated.

### *Policies (selected items)*

- Policy makers in relevant sectors will be addressed by country-specific briefings.
- Greenhouse implications of wood energy use will be further analysed and communicated.
- Awareness amongst donors on the greenhouse implications of wood energy will be raised.

### *Miscellaneous (selected items)*

- Wood energy-related projects viable for donor support will be identified.
- Results and experiences of RWEDP will be analysed and documented.
- The 'heritage' of RWEDP will be transferred in an optimal way.

## **2.4 Beyond RWEDP**

All available information indicates that wood energy will remain important for many decades to come. It is also quite likely that not all wood energy-related problems will be solved by 1999, when RWEDP will terminate. Some problems may even become more pressing. So, how can the momentum for wood energy development in Asia be maintained in the next century? This will very much depend on national efforts. It is not easy to make an assessment now.

Reference can be made to the achievements of RWEDP so far, as summarised in section 2 of this chapter, and the plans for the coming years, as summarised in section 3. By 1999 national policies will have developed further, many people will have been trained or at least briefed, and substantial information will have been disseminated. This all may help to sustain the momentum. Will it be enough? Probably for some countries it will be, for others not.

### Box 1: Wood Energy News

RWEDP has made special efforts to direct its periodical "Wood Energy News" to themes of wood energy development, in addition to the functions of in-house communications and reporting.

One of the means to support the momentum for wood energy development, and to keep the flow of information going, after RWEDP's termination, is the continuation of the Wood Energy News. As stated in paragraph 2, more than 3,000 institutions and individuals receive the Wood Energy News free of charge. What will happen in the future to this important means of information dissemination? Is it possible to charge a subscription fee to cover the costs\*? Is it possible to continue the production of the Wood Energy News in another form, under another agency?

The RAC Meeting was asked to advise RWEDP on these question regarding the Wood Energy News. In Chapter 8 and 9, the conclusions and recommendations of the meeting are listed.

\* Tables 1 and 2 show that even a fee of 3 US\$ per issue is not enough to cover the total expenses of the production. The fact is that many subscribers are not able or willing to pay.

Table 1: Costs per Issue of Wood Energy News of 28 Pages

Cash costs	Baht	US\$
honoraria for authors	25,000	780
language editing	4,200	130
lay out	10,000	310
printing	41,000	1,280
mailing	59,000	1,850
TOTAL	139,200	4,350

Table 2: Estimated Costs for a Free Subscription and a Charge of 3 US\$/issue

Costs in US\$	Free Subscription	Charge of 3 US\$/issue
net cash	4,350	2,000
staff time	5,000	7,000
TOTAL	9,350	9,000

Most countries have a high turn-over of leading and middle level government staff. Many of those committed to wood energy now, may be in different sectors or positions two years from now. This may not be favourable for the sake of continued national wood energy development.

We must be realistic. After 15 years of regional wood energy development we should not expect more of the same. If a follow-up of RWEDP is to receive donor support, it would likely be country specific or within a broader framework. Such a framework might be poverty alleviation in general,

gender aspects of development, food security, and the environment. We must also be realistic in other ways. Today's world is competitive, and donors are keen on efficiency and effectiveness of the projects they support and less keen to support bureaucratic procedures, overheads, or rituals and the like.

The international concerns about global climate change provide a strong case to justify wood energy development. RWEDP has calculated that woodfuel use in Asia alone results in avoided costs for carbon abatement of some 14 billion dollar per year (which in its present form will increase to 17 billion US\$ in the year 2010). It follows that all the money invested in the three phases of RWEDP together, is paid back in less than 11 months time, if the programme results in a 0.1% increase in wood energy conservation in the region (see Appendix 2.2). At this moment nobody knows what the exact contribution of a programme like RWEDP is or has been, because any contribution is indirect and RWEDP has not been designed with such specific targets in mind. Follow-up activities could address such an issue.

A recent World Bank Energy and Environment Strategy Paper (which is still in draft only) notes that if all the funds of the Global Environment Facility (2 billion US\$) were spent on carbon emission reduction projects, it would have the effect of forestalling global warming by only two weeks. I think the international community is looking for more effective and more lasting solutions. Several industrialized countries as well as international agencies have allocated substantial funds to offset carbon emissions. Perhaps RWEDP member-countries keen on donor support for further wood energy development could capitalize on the economic justification of woodfuel use in the framework of global environmental concerns. In this context I would refer you to a recent study commissioned by FAO-RAP on 'Opportunities for forestry investment in Asia and the Pacific through carbon offset initiatives' (in draft).

Apart from the context of the global environment, as mentioned above, the broader frameworks of poverty alleviation, gender, and food security, as well as natural resource management provide opportunities for further support to wood energy development in Asia. RWEDP can assist interested countries.

## **3. SUMMARY OF THE COUNTRY PAPERS**

### **3.1 Wood Energy Development in Bangladesh**

*Mr S. M. Jalil, Chief Conservator of Forests, Forest Department and  
Mr A. K. M. Nazmul Ahsan, Member, Industry and Energy Division, Planning Commission,  
Ministry of Planning*

#### **3.1.1 National Wood Energy Situation**

The energy situation in Bangladesh is characterized by heavy reliance on traditional sources of energy. This is primarily because Bangladesh cannot afford to import conventional energy sources.

According to the energy balance table of Bangladesh in 1990, total energy consumption was 682 petajoules and 73% of the total energy demand was supplied by biomass fuels. Biomass fuels come from the meagre amount of natural resources in the country and with the increase in population the pressure on the natural resources is increasing. 17.7% of the biomass fuels, or 12.9% of the total energy consumed (Energy Balance Table, 1990), came from wood. However, state forests meet very little of the country's fuelwood demand; non-forest lands supply the majority of fuelwood.

#### **3.1.2 Wood Energy Problems**

Although the positive effects of increasing the share of wood in the energy consumption, namely freeing dung and agricultural residues for soil improvement, are recognized, the fuelwood resources in Bangladesh are not adequate by any means. There exists a huge gap between demand and supply, which is steadily growing. At the same time there exists a lack of data and a lack of funds to implement the country's Forestry Plan.

#### **3.1.3 Wood Energy Development Activities**

The government recently promulgated the National Energy Policy (1995) and the National Forest Policy (1994). Both of these policies for the first time specifically address the issue of wood fuel and pledged the Government's commitment to improve the situation.

##### *Forestry Policy*

The most important intervention to ameliorate the wood energy situation is to enhance wood resources, especially on village grove/homestead forests. The forest policy aims to raise the tree cover to reach 20% of the total land area. Forests will be extended on all kind of lands.

The Forest Department has already started plantation activities in marginal and fallow lands with the participation of local people. Supported by the World Bank, 4,000 ha have so far been afforested.

A 20 year Forestry Master Plan has been prepared by the Forest Department with the assistance of ADB, UNDP and FAO and wood energy issues feature strongly in the plan.

## *Energy Policy*

The national energy policy of 1995 entails policy objectives for fuelwood production, similar to those in the national forest policy. Since Bangladesh uses more biomass fuel than wood fuel, the energy policy concentrates more on biomass fuel issues in general than on wood energy issues.

The energy policy puts emphasis on the conservation of biomass fuel by introducing fuel saving technologies like improved cookstoves and their dissemination in both households and commercial units. The Institute of Fuel Research and Development of the Bangladesh Council for Scientific and Industrial Research is involved in R and D of improved cookstoves.

Since 1991, there has been a ban on the use of fuelwood in brick making and currently a ban on the use of fuelwood for street tarring is proposed.

The energy policy also mentions that fuelwood shall only be used after meeting the demands for higher value added products like timber.

## *RWEDP in Bangladesh*

The activities of RWEDP have contributed to an increasing awareness of wood energy issues in the member countries. In Bangladesh, RWEDP has sponsored a sub regional workshop during 24–30 October, 1995 and a national workshop during 7–11 December, 1996 in collaboration with the FD, Bangladesh Agricultural Research Council and Rural Development Academy, Bogra. Presently RWEDP is planning to conduct a study on wood energy systems in Bogra, in collaboration with the RDA. Several staff of the FD have attended workshops and training courses at home and abroad sponsored by RWEDP. Therefore, the FD enjoys close and co-operative linkages with RWEDP in the cause of wood energy development in Bangladesh.

To harvest real benefits from the policies, effective co-ordination among various national organizations (both GO-NGOs as well as private sector organizations) is extremely necessary and RWEDP's activities in Bangladesh have made an important contribution to this.

### **3.1.4 Recommendations to RWEDP**

The Forest Department would like to ameliorate the fuelwood situation by promoting improved cookstoves in the household so that pressure on fuelwood resources is reduced and women can enjoy comfortable cooking conditions. FD would like to have training for its extension agents with the sponsorship of RWEDP. Then they can launch an extension campaign with demonstration at the grassroots level. This program would cost around 10,000 US\$.

Another program which can be pursued is one designed to increase the efficiency of fuelwood use by installing capacity for briquetting, initially to a limited extent.

These two programs can be prepared as a formal proposal if RWEDP responses favourable.

Regarding human resources development, FD feels that training on data collection and monitoring is needed for the country's forestry extension agents.



## **3.2 Wood Energy Development in Bhutan**

*Mr Sangay Thinley, Joint Secretary, Forestry Service Division, Ministry of Agriculture and  
Mr Bharat Tamang, Division of Power, Ministry of Energy*

### **3.2.1 National Wood Energy Situation**

Biomass contributes over 98% of the domestic energy consumed, and 88% of all the energy used in the country. The biomass is mainly from fuelwood and to a limited extent from agricultural residues. The capacity of the surrounding forests to generate fuel is much larger than the demand in most areas. There are, however, pockets of scarcity. People generally consider access to sufficient fuel wood a traditional right. Lops and tops and dry wood can be collected without charge. Biomass, particularly firewood, is expected to remain the most important source of energy in rural areas for quite some time to come. New energy sources such as oil, gas, electricity, though gaining ground in urban areas, have remained unavailable in rural areas due to transportation problems.

### **3.2.2 Wood Energy Problems**

With the growing population and increasing demand for wood energy, a tendency of gradual forest degradation has been noticed particularly around larger settlements. If this problem is not addressed it is perceived that:

- life in rural areas will become difficult and people will have to spend more time collecting fuel wood at the cost of other farm works and farm output;
- the life style of the majority of Bhutanese people, who are basically rural, will change which will have an impact on the culture and traditions that have evolved over centuries; and
- the rich bio-diversity and the country's watershed areas will be threatened.

### **3.2.3 Wood Energy Development Activities**

The Royal Government of Bhutan has recognized the importance of biomass energy and the need to ensure a regular supply to all consumers. The national forest policy directs that one of the main goals for the forestry sector is "meeting the long term needs of the people for wood and other forest products by placing all the country's production forest under sustainable forest management." People's participation is considered crucial and has become the paramount strategy for forestry development.

To enhance people's participation, the Forestry Services Division has initiated the following measures:

- a review of the existing policies and a revision of the Forest Act in a manner to encourage people to take part in forestry programmes;
- the creation of a strong decentralized extension service to provide technical support to the farmers;
- the development of different social/community forestry models and the enactment of supporting rules which empower the FSD to transfer tenure rights to land and trees to the people; and
- the provision of strong research support to the programme. Emphasis is being placed on fuel wood and multipurpose trees.

### **3.2.4 Recommendations to RWEDP**

In Bhutan, RWEDP may be able to assist in the following key areas, which need further attention:

- conducting regular workshops not only at the national level but also at the grassroots level. Such workshops bring out problems and constraints and are important in creating awareness among the users. So far, activity in these fields has been limited due to the lack of funds and expertise;
- assisting in the development of national energy policy and legislation and assisting in the development of a database including a survey of resources;
- assisting in the effective utilization of wood energy, including improved efficiencies and enduse appliances (e.g. smokeless stoves, room insulation, etc.);
- assisting in institutional development for proper co-ordination of inter-sectoral linkages including proper functioning of a National Body on Energy Development.

### **3.3 Wood Energy Development in Cambodia**

*Dr Sat Samy, Deputy Director, Energy Department, Ministry of Industries, Mines and Energy,  
Mr Or Soeun, Deputy Director, Department of Forestry, Ministry of Agriculture Forestry and Fishery and  
Mr Than Sarath, Official, Planning Office, Department of Forestry*

#### **3.3.1 National Wood Energy Situation**

According to results of several studies on wood energy consumption in Cambodia (of which many were carried out with support of RWEDP), about 92% of the population uses firewood and charcoal, primarily from natural forests and trees outside forest areas, as their main source of household energy.

#### **3.3.2 Wood Energy Problems**

Fuelwood gathering contributed to land degradation, particularly in the non-forested provinces and densely populated central and south-eastern parts of Cambodia, where population pressure and inefficient fuelwood use, often combined with other forces, have promoted chronic supply shortages.

There is a need to develop a better understanding of wood fuel systems and their environmental effects, in order to develop policies to promote the sustainable harvest of wood for fuel.

#### **3.3.3 Wood Energy Development Activities**

##### *Energy Policy*

The main points of the energy sector policy are the following:

- provide an adequate supply of low cost energy for homes throughout Cambodia;
- ensure a reliable, secure electricity supply at a price which encourages economic investment and development in Cambodia;
- encourage environmentally and socially acceptable development of energy resources needed for all sectors of the Cambodian economy;

- encourage efficient use of energy, including charcoal and wood and to minimize environmental effects resulting from energy supply and use;
- encourage private sector involvement in projects for development of energy resources and the distribution and sale of energy;
- increase MIME's and the Energy Department's knowledge of energy resources such as hydropower, coal, oil, gas, charcoal and wood;
- rehabilitate the EDC so that it becomes an efficient organization to develop non-polluting and renewable energy sources;
- establish a legal and regulatory framework for energy supply;
- develop a policy and regulatory regime for private sector involvement in the energy sector; and
- develop investment programmes and projects for energy facilities and seek funding.

### *Forest Policy*

The Department of Forest and Wildlife has prepared a long-term strategy for the forestry sector with the following components:

- a policy for sustainable forest management;
- a log export ban;
- a fuel wood and charcoal export ban; and
- the encouragement of reforestation.

### *RWEDP in Cambodia*

Cambodia's representatives from the Energy Department and Forestry Department have already participated in the second and the third regional training on wood energy planning.

#### **3.3.4 Recommendations to RWEDP**

First of all, the assistance of RWEDP is needed to upgrade staff, to strengthen the capabilities for wood energy planning and data analysis. Secondly, Cambodia needs a study on wood energy demand forecasting to prepare a policy plan for ensuring a sustainable supply of fuelwood for the population.

### **3.4 Wood Energy Development in China**

*Mr Cai Mantang, Deputy Director, International Farm Forestry Training, The Chinese Academy of Forestry and*

*Mr Wang Xiwu, Official, Department of Environment Protection and Energy, Ministry of Agriculture*

#### **3.4.1 National Wood Energy Situation**

Wood fuel is still the major energy source for domestic and industrial uses in rural China. The rural energy derived from biomass declined from 71% (in 1979) to 44% (in 1993) of the total energy consumption in China. About 50% of biomass energy is derived from wood. Although the proportion of wood energy is reducing, the absolute amount of wood energy is still increasing. The area of forest for energy increased from 1.2 million hectares in 1980 to 6 million hectares in 1990.

### 3.4.2 Wood Energy Development Activities

China became one of the RWEDP member countries at the start of the Programme's third phase. Because China is a new member, RWEDP-China co-operative activities have focused on the establishment of a workable framework for the implementation of the programme, including institutional arrangements, identification of key fields of co-operation, etc. The major RWEDP-China wood energy development activities can be divided into 6 subjects:

#### 1. *Research and Development*

Wood energy research was listed as one of the national key research projects in the sixth and seventh five year economic and social development plans. During the last 15 years, wood energy research has produced many important findings, including the identification of fuelwood species for different climatic zones and their silvicultural and management techniques and more than 100 demonstration counties have been established for integrated rural energy development.

#### 2. *Institutional Arrangements*

A start was made to bring all the governmental actors involved in the wood energy sector together. The most important central governmental organizations are the Ministry of Forestry, the Ministry of Agriculture and the State Planning Commission.

#### 3. *RWEDP-ASARDL (Alternative Socio-economic Approaches to Reclaiming Degraded Lands) Linkage*

After discussions with RWEDP, ASARDL agreed to focus the co-operative activities on wood energy considerations in community-based natural resources management and socio-economic issues of wood energy. These fields of co-operation will be implemented through a series of case studies.

#### 4. *Participation in RWEDP's Regional and Sub-regional Activities*

China sent a total of 16 persons to join RWEDP's regional and sub-regional activities. This has been a valuable opportunity for Chinese scientists to improve and strengthen their research capabilities.

#### 5. *National Advisory Committee (NAC) and National Working Groups (NWGs)*

A NAC was established in 1995. The NAC consists of members of the CAF, Department of Energy and Environmental Protection, MOA, CAAERP, MOF and SPC. The NAC will be in charge of decision-making and co-ordination at macro-level in the field of wood energy development. The NAC decided to establish two National Working Groups:

- National Working Group on Wood Energy Resources and Planning
- National Working Group on Utilization of Wood Energy.

#### 6. *Joint Research Activities*

A number of case studies were carried out in co-operation with RWEDP.

### **3.4.3 Recommendations to RWEDP**

RWEDP-China will continue to strengthen the national network for better implementation of RWEDP activities in China, including using RWEDP's contributions to promote the research and development capabilities of related organizations, and to share Chinese experiences with other RWEDP member countries through the joint efforts of RWEDP and the Chinese National Working Groups. The major activities for the coming year are:

- detailed proposals/plans for joint activities with RWEDP will be drafted and sent to RWEDP for approval so that the activities can be started as soon as possible;
- organization of a national training course on rural energy planning--detailed proposals will be prepared by the Research Institute of Energy and Environment Protection of CAAERP
- strengthening the activities of the national working groups; and
- joining the regional activities of RWEDP.

## **3.5 Wood Energy Development in India**

*Dr N. P. Singh, Director, Biomass Division, Ministry of Non-conventional Energy Sources and  
Mr S. K. Pande, Additional Inspector General of Forests, Ministry of Environment and Forests*

### **3.5.1 National Wood Energy Situation**

The rural population (which is about 75% of the total population) still depends on non-commercial sources of energy, mainly biomass. Biomass accounts for about 40% to the total energy consumption in the country. The main sources of fuelwood are forests and privately owned farms, shrub species and commercial fuelwood plantations.

### **3.5.2 Wood Energy Problems**

In India, there exist a gap between the supply of and demand for fuelwood. The shortage of fuelwood in India is normally met from agricultural residues and cattle dung which could be used for enriching degraded lands.

### **3.5.3 Wood Energy Development Activities**

The Ministry of Non Conventional Energy Sources is the central ministry responsible for research and development, demonstration, commercialization and promotion of new and renewable energy including bio-energy. Several projects/programmes on R and D, demonstration and extension have been taken up for implementation through national laboratories, universities, industries, state governments and NGOs.

Several projects have been implemented:

- biomass production and improvement practices on degraded lands (35 species);
- biomass briquetting R and D--annually, 320 million tonnes of agri waste is generated from the 80 machines which have so far been installed);
- a national project on biogas development was initiated in 1981-- five models have so far been implemented by GOs and NGOs with a fixed amount of financial support. 2.4 million plants have been set up under the project;
- a national programme on improved cookstoves was launched in 1985. This aims at the conservation of fuel, halting deforestation, environmental upgrading, reduction in the drudgery of women and female children and improved kitchen environments. 26 million ICs

have been installed and about 2.5 million are added every year with 25–30% of the total cost being subsidised;

- a biomass gasification programme consisting of R and D and demonstration activities was implemented at the start of the 8<sup>th</sup> Five Year Plan (1992–97). Biomass gasification technology is considered to be one of the most promising and appropriate renewable energy technologies for utilizing the locally available biomass efficiently for the generation of thermal, mechanical and electrical power in a decentralized and sustainable manner. Four projects have so far been established. The Gasifier Action Research Centres of MNES is involved;
- a national co-generation and combustion programme was launched by MNES in 1994 with the objective of creating favourable conditions for the early exploitation of the identified potential of about 3500 MW of surplus power in the country's 420 sugar mills. Two projects in the private sector are currently in operation;
- an energy from urban and municipal waste project has been established with a national Bio-energy Board set up by MNES to develop and promote it; and
- various fiscal incentives are available to the manufactures and users of renewable energy technologies.

### **3.6 Wood Energy Development in Indonesia**

*Mr Mursidin, Director, Afforestation and Social Forestry, Director General of Reforestation and Rehabilitation, Ministry of Forestry and*

*Ms Marayam Ayuni, Head, Sub-Directorate of Rural Energy, Directorate General of Electricity and Energy Development, Ministry of Mines and Energy*

#### **3.6.1 National Wood Energy Situation**

Fuelwood's role in Indonesia remains dominant in the rural area, especially for household purposes, but it is also used in small industries such as food, brick, roof tile and ceramic industries.

In 1990, it was recorded that the national fuelwood consumption was 76% of the total energy consumption. Yet the level of consumption varies from one place to another and depends partly on population density.

The total consumption of wood energy is assumed to increase with the growth of the population.

#### **3.6.2 Wood Energy Problems**

Due to the reliance of the continuously increasing number of settlements on the surrounding forest area, fuelwood demand is also continuously increasing and has become a threat to the forest resources.

Other problems related to wood energy development are the following:

- Central and Local Government as well as the society in general have paid very little attention to the development of fuelwood.
- Society's perception of fuelwood problems are not accurate. Mostly, people think that fuelwood issues are of little value and uninteresting and do not need to be taken seriously. Although in fact, fuelwood deficits have become a serious problem.
- Farmers and entrepreneurs lack information on fuelwood matters.
- Inadequate capital and financial support, lack of various forms of incentives for private forest, fuelwood development.
- Land area for fuelwood plantation development is limited.

### **3.6.3 Wood Energy Development Activities**

In Indonesia, three major policy documents with regard to wood energy development exist: the Inpres Reboisasi Dan Penghijauan (the Presidential Decree), the Pelita VI (the fourth five year plan) and the General Energy Policy.

The development of fuelwood carried out within the programme of land rehabilitation (since 1976) is implemented in accordance with the Presidential Decree. This programme consists of several activities, such as development of private forests and afforestation. According to the country delegates of Indonesia, the area of private forests developed within the programme has so far reached 1.1 million ha, producing approx. 220 million m<sup>3</sup> of logs and 110 million m<sup>3</sup> of fuelwood. The afforestation activity has been undertaken on 4 million ha, producing 200 million m<sup>3</sup> of log and 100 million m<sup>3</sup> of fuelwood.

In order to reach the development goals of Pelita VI ( the Sixth Five Year Plan) the following policies in connection with wood energy development will be implemented:

- establishment of new plantation forest ( in total 800,000 ha);
- social forestry venture development (250,000 ha.)
- water, soil and forest conservation (protecting a forest area of 30 million ha and conserving a land area of 19 million ha);
- critical land rehabilitation; and
- coastal area development.

The main policies concerning fuelwood and biomass development in Indonesia within the framework of the general energy policy comprise:

- efforts to minimize oil utilization and to improve electricity development;
- efforts to develop new energy sources;
- biomass energy development;
- wood energy development; and
- wood gasification/biomass development.

Wood energy development consists of (1) utilization of wood waste for power plants as found in plywood industries and (2) utilization of wood and wood waste for charcoal and charcoal briquetting.

## **3.7 Wood Energy Development in Lao PDR**

*Mr Daopheng Pannhasith, Deputy Director general, Department of Planning, State Planning Committee and*

*Mr Bouaket Sayasouk, Technician, Department of Forestry, Forest Protection and Wood Industry Division*

### **3.7.1 National Wood Energy Situation**

At present, indigenous fuelwood is the main source of energy consumed in the country, especially in rural households. The estimated amount of annual fuelwood use was about 4 million m<sup>3</sup>, including branches and barks.

### **3.7.2 Wood Energy Problems**

As Lao people's reliance on fuelwood is not expected to change within the near future, there is an urgent need to plan the strategies and programmes to promote woodfuel production and supply. Due to limited resources and often lack of co-ordination and co-operation between relevant organizations, the situation can not be dealt with adequately. Other problems are lack of support and lack of experience at national and local level to adopt new technologies.

### **3.7.3 Wood Energy Development Activities**

Several activities in the field of wood energy are:

- In 1996 the government issued the Forest Law under which land and forest will be allocated to the population for long term use, reforestation and preservation.
- At present, Lao PDR is preparing a national workshop on "Production, Utilization and Marketing of Woodfuel".
- The State Planning Committee (Department of Planning) and the Ministry of Agriculture and Forestry (Department of Forestry) act as the focal points for RWEDP.

### **3.7.4 Recommendations to RWEDP**

There is a need to conduct training courses on the LEAP-model.

## **3.8 Wood Energy Development in Malaysia**

*Dr Pola Sing, Principal Assistant Director, Energy Section, Economic Planning Unit, Prime Minister's Department and  
Dr Hoi Why Kong, Director, Forestry Research Institute of Malaysia*

### **3.8.1 National Wood Energy Situation**

The main energy sources in Malaysia are petroleum (oil and liquid fuel), coal, hydropower, agricultural-based energy, wood based energy (or biomass energy) and solar energy.

In Malaysia, it has been realized that biomass has great potential as fuel. Evaluation of this potential has been continuously carried out, often independently by various groups. The total amount of energy supplied by biomass is 2.5 Mtoe whereas the final energy demand for the country in 1990 was 13.2 Mtoe. The contribution of biomass fuels to the energy demand not only exceeded that of hydro-power, but exceeded the total amount of electricity used. Biomass contributed 16% of the final energy consumption of the country.

The single most important use of wood residues is fuel. The popularity of wood as fuel is mainly due to its availability at the sawmills; it is also the cheapest source of energy.

### **3.8.2 Wood Energy Problems**

Although the development of Renewable Energy (RE) appears to be a promising option, several barriers remain that make it difficult for RE systems to develop. The major problems include the preferential bias for conventional energy, prevailing prejudices, norms and attitudes against RE, lack of policy initiatives to promote the development of RE, high development costs, lack of institutional support and limited government assistance.



### **3.8.3 Wood Energy Development Activities**

The development of biomass in Malaysia is undertaken as part of the overall strategy to develop and promote renewable sources of energy. Currently Malaysia's energy policy is anchored on security of supply, efficient utilization and environmental protection as well as energy diversification. RE has not been incorporated into the current policy framework although the country is endowed with significant renewable energy resources which remain largely untapped.

Several on-going development activities in the field of wood energy are:

#### *Institutional Framework*

To strengthen the institutional framework for the energy sector, the government is in the process of establishing a National Energy Centre. The NEC will serve as a national energy focal point in terms of gathering data and information pertaining to energy and energy related activities.

#### *World Solar Programme*

Apart from solar energy, the World Solar Programme encompasses other sources of renewable energy such as biomass, wind, geothermal, hydro and ocean. Malaysia hosted the Asia Pacific Solar Meeting in Penang in 1996 and Dr Mokhzani Mahathir, Prime Minister attended the World Solar Summit.

#### *Biomass R and D Projects*

Several biomass R and D projects are funded currently by the government under its "Intensification of Research in Priority Areas Programmes".

#### *Education and Training*

Education and training has been and will continue to be an on-going strategy to increase awareness of the need to increase the use of renewable energy to minimise dependence on fossil fuels and to protect the environment.

### **3.8.4 Recommendations to RWEDP**

RWEDP's assistance, in any form, to undertake a comprehensive study on renewable energy, including biomass, would be appreciated. The focus of this study will be as follows:

- an analysis of the current status of RE including inventory of RE energy sources;
- an analysis of the status of RE technologies, particularly those that pertain to more efficient processes and have minimal impact on the environment;
- an evaluation of the effectiveness of current policy initiatives, programmes and strategies in respect of RE in the context of the overall national energy policy; and
- the development of a comprehensive data base for each of the RE resources as well as a formal reporting system to ensure that RE data is incorporated into the annual national energy balance report.

### **3.9 Wood Energy Development in the Maldives**

*Mr Mohamed Zuhair, Director, Agriculture Services, Ministry of Fisheries and Agriculture*

#### **3.9.1 National Wood Energy Situation**

In the Maldives, wood is a dominant fuel source for cooking particularly on the outer islands. However, no systematic data is available on fuelwood consumption. In Male, gas and kerosene have replaced fuelwood. However, wood is still widely used for cooking by most of the rural households.

#### **3.9.2 Wood Energy Problems**

There is a shortage of firewood in the country and this varies from island to island. Felling trees for timber and fire wood is the major cause of deforestation. Although a government regulation requires that each tree cut down must be replaced by two newly planted trees, this system is almost impossible to administer.

#### **3.9.3 Wood Energy Development Activities**

The government has taken a number of measures to address the decline in the tree population. The Ministry of Fisheries and Agriculture (MOFA) has restricted the issue of timber cutting permits in order to allow tree regeneration. MOFA commenced a tree planting programme in 1996 which had a target to plant one million trees in a three year period. The target of one million trees was met in early 1997 and the overall target has now been raised to two million trees for the same three year period.

#### *RWEDP in the Maldives*

The Maldives has benefited significantly from RWEDP. The project has contributed to strengthening the capacities of the institutions dealing with wood energy. Since 1995, six workshops/expert consultations have been attended by delegates from the Maldives.

#### **3.9.4 Recommendations to RWEDP**

It is hoped that RWEDP will continue to contribute to the sustainable production of fuelwood, and its focus on efficient processing and marketing and thereby help to improve the efficiency of wood and biomass energy utilization in the country's households.

### **3.10 Wood Energy Development in Myanmar**

*Prof. U Win Kyi, Institute of Forestry and  
Mr U Khin Maung Maw, Assistant Director, Energy Planning Department, Ministry of Energy*

#### **3.10.1 National Wood Energy Situation**

Woodfuel is still the major energy source in the country. Wood fuel contributes as much as 75–80% of the total energy demand. The consumption growth rate of woodfuel directly varies with the growth rate of the population. It was calculated that the consumption of woodfuel has been increasing steadily at an annual average rate of 1.1 %. In rural areas, fuelwood is used almost exclusively for domestic cooking, but it is also the main source of energy for the cottage industries.

Three major sources for the supply of fuelwood exist in the country: natural forests, plantations and non forest lands. The role of natural forests has declined due to increasing population pressure and over-exploitation of the forests. According to a study on woodfuel production in the dry zone, 40% of the total fuelwood production comes from home gardens.

### **3.10.2 Wood Energy Problems**

In Myanmar there exists an imbalance between the demand for fuelwood and its sustainable supply. The fuelwood supply-demand imbalance is going to worsen unless effective steps are taken to augment the sustainable supply of fuelwood.

### **3.10.3 Wood Energy Development Activities**

The Ministry of Energy has the main responsibility for fulfilling the energy needs of the country and consists of one department and four economic enterprises.

On the basis of the energy policy framework and a market led economy the following strategies will be pursued in the renewable energy sector:

- the introduction of wind power technology and solar power technology in favourable areas of the country;
- the innovation of efficient firewood stoves; and
- the encouragement of biogas production in rural areas.

An ICs programme was started in the Forest Research Institute, Yezin in 1986. From October 1994 till July 1997 about 33, 500 so called A-1 stoves were produced and sold. The price of the stove is 100 Kyat. To disseminate the production of A-1 stoves all over the country, several training courses on making A-1 stoves were held at Yezin. Some co-operatives and private entrepreneurs from all over the country are now producing the A-1 stoves. The total number of A-1 stoves produced and sold up to September 1996 was about 99,400.

The Ministry of Forestry will establish a new department, the Dry Zone Greening Department to green the dry zone by planting trees together with follow-up conservation activities. The primary objectives of this Dry Zone Greening Project are:

- to minimise environmental degradation inclusive of soil and water erosion;
- to provide a supplementary supply of fuelwood for local people;
- to enhance the viability of agriculture through amelioration of climatic conditions over time;
- to improve the greening effects of the entire environment; and
- to raise communities' awareness of the values of trees and forests.

### **3.10.4 Recommendations to RWEDP**

Assistance of RWEDP is needed in several fields:

- The fuelwood supply-demand imbalance is going to worsen unless effective steps are taken to augment the sustainable supply of fuelwood.
- The rural communities should be mobilised to support and raise multipurpose fuelwood woodlots and manage them in sustainable manner on homestead and farm lands.
- Comprehensive information and data related to fuelwood situation should be systematically collected. Only then can proper planning for fuelwood plantation programmes be carried out.
- Improved cook stoves should be distributed to both urban and rural communities at subsidised cost. Priority should be given to fuelwood deficient areas.

- At the same time, technologies to improve efficiency in kilns and stoves should be promoted, not as a back room research activity but as an urgent and important research activity, the results of which would greatly benefit the people of Myanmar both at present and in the future.
- It is envisaged that LPG, natural gas and electricity may eventually replace to some extent, firewood and charcoal use in urban areas.
- More co-operation with countries in the region with similar fuelwood situations is essential. Regional organizations such as the “Regional Wood Energy Development Programme is one of the examples of such co-operation which should be emulated.

### **3.11 Wood Energy Development in Nepal**

*Mr Bal Krishna Khanal, Deputy Director General, Department of Forests and  
Mr D. L. Shresta, Director, Energy Planning Division, Water and Energy Commission Secretariat*

#### **3.11.1 National Wood Energy Situation**

More than 85% of the rural population rely on wood energy for cooking their meals.

#### **3.11.2 Wood Energy Problems**

Nepal is facing an alarming situation in Terai where the rate of deforestation is 1.3% per year.

#### **3.11.3 Wood Energy Development Activities**

*Forest Management Strategies of the Department of Forests:*

- All forests in hills will be managed as community forests.
- All forests in plains areas shall be identified as productive forests, protected areas for biodiversity or potential community forests. To manage the forests in the plains, management plans will be developed

*Programmes for Wood Energy Development:*

- Briquette making in private sector, using non-wood forest products has been initiated,
- Improved stoves training for women to build their own stove using locally available raw material is in progress.
- Agriculture Development Bank provides a subsidy of Rs. 7000 to those who install biogas plant.

The biggest constraint to implement these programmes is the budget limitation.

#### **3.11.4 Recommendations to RWEDP**

Advice of RWEDP to solve the problems in the Terai is recommended.

### **3.12 Wood Energy Development in Pakistan**

*Mr Rafiq Ahmad, Acting Inspector General of Forests, Ministry of Environment,  
Mr Shehryar Khan, Chairman, Pakistan Council of Appropriate Technology, Ministry of Science and Technology and  
Mr Zamir Ahmed, Deputy Chief, Planning and Development Division, Energy Wing*

### **3.12.1 National Wood Energy Situation**

Fuelwood use forms 53% of the total energy consumption in Pakistan, charcoal, 1%, crop residues 14%, dung, 18%. Biomass consumption is still increasing.

### **3.12.2 Wood Energy Problems**

Pakistan faces several problems related to wood energy, namely:

- lack of data about wood energy consumption and production;
- lack of available modern harvesting tools/equipment for farmers;
- an inability to meet the growing demand of wood based industries; and
- the marketing of fuelwood in the private sector.

### **3.12.3 Wood Energy Development Activities**

*The overall forestry policy objectives are:*

- to conserve existing forests by sustainable use;
- to expand the forestry resources base;
- to rehabilitate watershed areas; and
- to rehabilitate waterlogged, saline and alkaline lands through biological amelioration.

*The activities in the field of wood energy based on the participatory approach are:*

- decentralization of nurseries;
- community involvement in management of forests;
- development of village organizations;
- development of agroforestry models;
- introduction of multi-purpose tree species;
- development of extension service;
- involvement of NGOs;
- training of forestry professionals in agroforestry;
- training of farmers;
- awareness campaign through media; and
- publication of literature.

### **3.12.4 Recommendations to RWEDP**

Assistance of RWEDP is requested for the following:

- to undertake a study on plantations on farmlands;
- to train wood consumers and artisans through study tours designed to transfer technology;
- to assist in updating the forestry sector master plan and other documents; and
- to develop policy making and strategic planning skills.

## **3.13 Wood Energy Development in the Philippines**

*Mr Jessie C. Elauria, Director, Energy Utilization Management Bureau, Department of Energy, Philippines and*

*Mr Hardinado Patnugot, Regional Technical Director-Forestry, Forest Management Bureau*

### **3.13.1 National Wood Energy Situation**

In 1996 new and renewable energy provided 32% of the total energy mix, of which about 19% was accounted for by fuelwood.

### **3.13.2 Wood Energy Problems**

#### *Lack of appreciation of the need for wood energy development*

Despite the important role of fuelwood, little attention has been given by senior-level officials to wood energy development.

#### *Weak institutional structure*

A concerted effort to integrate the policies of government agencies responsible for agriculture, energy and natural resources are necessary to ensure successful wood energy development. However, the agriculture, energy and forestry departments each have their own set of priorities so that the integration of wood energy into their individual structure is inadvertently overlooked

#### *Conflicting resource base inventories*

Two studies have already been conducted in the past which both aimed to analyse the national biomass resource potential. However these two studies provide totally different estimates on wood energy supply and demand.

### **3.13.3 Wood Energy Development Activities**

The Philippines energy policy is anchored to ensuring energy sufficiency, reliability and affordability within the context of environmental promotion and protection. Over the past years, national energy planning has concentrated on the indigenous conventional and renewable energy sources. Fuelwood became officially part of the country's energy mix in 1995, after NCED conducted a nationwide resource systems installation census.

In 1995, the National Advisory Council (NAC) was created to act as the focal point for RWEDP. This is composed of the Department of Energy, Natural Resources and Environment and the Department of Agriculture. Its task, among others, is to set priorities for programme implementation and review and approve projects submitted by the National Wood Energy Working Committee (NWEWG) composed of technical representatives from relevant units of the above mentioned departments including appropriate government institutions and non-governmental organizations. The NWEWG has been tasked to facilitate co-operation and co-ordination on all technical aspects of wood energy development. However, the integration of wood energy policies and programs into the priorities of the respective departments, and the effective functional co-ordination between and among these relevant institutions have yet to manifest.

In the coming three years the following activities will be undertaken:

Conducting several wood fuel case studies, monitoring the contribution of woodfuels in the energy mix, applying the LEAP model for wood energy planning at the provincial level and conducting national seminar/workshops on wood energy issues.

### *RWEDP in the Philippines*

- Right after the approval of RWEDP, the Philippines, through the DOE, established the NAC.
- Two national seminar-workshops have been conducted on wood energy development. The first one entitled “National Seminar on Wood Energy Planning, Policies and Strategies” was held in Cebu City on March 1995. The second seminar, conducted in the latter part of 1996 in Manila, focused on Wood Energy Data Collection, Assessment and Analysis.
- Research, with funding assistance from RWEDP, will be undertaken by the Mariano Marcos State University. The study aims to integrate wood energy aspects into the local level development planning activities and to develop the institutional capabilities of the local agencies.

#### **3.13.4 Recommendations to RWEDP**

Priority follow-up activities after RWEDP:

##### *Sustainability of the institutional structures*

The creation of the National Advisory Committee and the National Wood Energy Working Group is a significant move to co-ordinate and integrate wood energy policies, programs and activities in the country. Hence ensuring its sustainability is crucial. An Executive Order would be one way to achieve this.

##### *Development of system for the inventory of wood energy resource base*

A system to determine the wood energy resource base should be established which will be acceptable to both the forest and energy sectors. This will prevent future differences in the estimation of this base and ensure common analysis and projections.

##### *Establishment of a permanent regional center on wood energy*

After RWEDP, a permanent inter-regional body which will co-ordinate efforts and activities and allow sharing of information on the wood energy sector among countries seems to be necessary. Initiatives from the ASEAN body may be solicited, including permanent funding for its operations.

### **3.14 Wood Energy Development in Sri Lanka**

*W.R.B. Rajakaruna- Chairman, Energy Conservation Fund and  
Mr W. A. D. A. Wijesooriya, Deputy Conservator of Forests, Forest Department*

#### **3.14.1 National Wood Energy Situation**

The country is mainly agricultural and its total forest area in 1956 and 1994 was estimated at 44% and 23.9%, respectively of the total land. This is now reduced to 23.9% in 1994. Sri Lanka is a country with moderate energy resources of its own, with no proven resource of fossil fuels. Hydro energy and biomass (mainly fuel wood) are Sri Lanka's only indigenous resources. All of the fossil fuels used in the country are imported.

The energy supply in Sri Lanka is based on 3 primary sources of energy: hydro electricity, petroleum and biomass. Hydro electricity and biomass account for approximately 74% of the total energy needs of the country while the remainder are met mainly by petroleum products. It is estimated that the biomass sector alone has a share of around 57% in the national energy supply or around 3,800 ktoe.

Although the total area under forest cover is declining rapidly, 1.4 million hectares of marginal land suitable for energy plantation are available in Sri Lanka. Even if only 30% of this 1.4 million hectares of marginal land is devoted to energy plantations it will amount to approximately 3.8 million tons of oil equivalent, which is almost the entire forecasted petroleum demand for 2005. Since there are no fossil fuels and the potential for further hydro power development is low, this brings into focus the importance of biomass and wood energy plantations for meeting the future energy needs of Sri Lanka. This is particularly so in view of the fact that thermal power based on petroleum is becoming more and more expensive.

### **3.14.2 Wood Energy Development Activities**

#### *Institutions*

In the power and energy sector, the Ministry of Irrigation and Power is the body which decides policy and directs implementation. The Energy Conservation Fund operates as the main institutional set up for energy planning and management. The Fund has a wide mandate for developing policy and programmes in the energy sector. The entire wood energy development programme is handled by the ECF along with the Forest Department and the Renewable Energy Division of the Ministry of Science and Technology.

The National Advisory Committee on Wood Energy Development was established in the latter part of 1996. Its members comprise the Secretary to the Ministry of Irrigation and Power, the Chairman of the Ceylon Electricity Board, the Chairman of the Ceylon Petroleum Corporation, the Chairman of the Energy Conservation Fund, the Chief Conservator of Forests, the Deputy Director to the Treasury and a Professor/Specialist on Power and Energy from one of the universities. The National Advisory Committee Acts as the Focal Point for RWEDP, as well as for those programmes of the Energy Division of the ESCAP.

#### *Programmes*

In the context of the energy scenario described above, the importance of wood energy as a primary source of energy is being felt and important steps are now being taken to develop the fuel wood sector. Studies and pilot projects have been undertaken in several parts of the island on energy plantations. The strategy envisaged is to go in for short rotation high density coppicing energy plantations. Apart from using wood energy for production of direct energy, it is also expected that a few dendro-thermal plants of small capacity will be established on an experimental basis to look into possibilities of establishing viable dendro thermal power generation in the future.

One of the earliest programmes undertaken by the ECF along with the Ceylon Electricity Board was the improved cook stove programme funded by the Dutch Government. Over 500,000 improved cook stoves were introduced by the end of 1993. The programme has become so popular that local entrepreneurs making and selling cook stoves have a large market for their products.



Several types of gasifiers were tried out for bakeries and tea withering. Programmes have been undertaken to introduce efficient use of wood in brick and tile factories and an effort has been made to introduce paddy husk for firing brick kilns. An attempt was also made, with German aid, to briquette coir dust for firing oil mills. However, this did not prove to be a success due to a stronger demand for coconut waste as a growing medium for export.

Tea withering with efficient use of fuel wood has been demonstrated and promoted with some success as it is less expensive than diesel firing which has been gaining dominance in tea factories. The manufacture of coconut shell charcoal is well developed and much of it is exported. However, the heat recovery process from the manufacture of coconut shell charcoal has not progressed so far and is now being pursued by the ECF. Studies are on the way to identify and develop appropriate wood charcoal processing technology. This exercise has become rather important at the moment since more and more urban households are now adopting LPG for cooking. More recently ECF has undertaken, with RWEDP funding, a Rural Energy Planning project in the different provinces. The ECF has been associated with RWEDP since its inception and have benefited in more than one way from its programmes.

### **3.14.3 Recommendations to RWEDP**

It is proposed to initiate a project to assess wood energy use in rural industries and to assess the potential for introducing and developing improved energy conversion technologies. This proposal is being made particularly in view of the fact that highly improved gasification and heat recovery processes as well as co-generation techniques developed in countries like India and Malaysia may help us to improve our use of wood energy in rural industries.

It is also proposed to undertake a project to identify suitable industries and introduce efficient technologies for the use of paddy husk in Sri Lanka. Currently, this is simply been burned on wayside dumps.

## **3.15 Wood Energy Development in Thailand**

*Mr Pairach Woravech, Director, Bureau of Energy Study, Department of Energy Development and Promotion,*

*Mr Winai Panayathanya, Head, Wood Energy Research Subdivision, Royal Forest Department, Mr Prasert Verapong, Sr. Scientist, Department of Energy Development and Promotion, and Mr Pralong Dumrongthai, Wood Energy Research Subdivision, Royal Forest Department.*

### **3.15.1 National Wood Energy Situation**

In 1995, the total energy consumption was 48,766 million tons of oil equivalent which increased from the previous year at the rate of 11.2% (Annual Report DEDP, 1995). Of the total energy consumption 24.2% came from biomass energy. The share of biomass has decreased from 36.4% in 1985.

### **3.15.2 Wood Energy Problems**

Problems and constraints on implementing wood energy development activities:

- Almost all of the technologies are still at the R and D stage and they still require standardization for large scale utilization.
- Information on technical aspects of wood energy equipment under local conditions is not sufficient and reliable enough to facilitate further action for large scale utilization.
- Qualified personnel in the field of wood energy are scarce.

### **3.15.3 Wood Energy Development Activities**

The main energy policies as formulated in the seventh five year plan are as follows:

- encouragement of efficient use and conservation of energy;
- emphasis on developing domestic energy resources; and
- promotion of private sector involvement in energy development.

The draft Thai Forestry Sector Master Plan indicated that the long term objective of fuelwood and rural energy development is to ensure that forest resources and farm biomass are able to meet the energy needs of the rural people and industries. However, the fuelwood deficit will not be significant in the long term, because fuelwood demand is declining as a result of the changing pattern of energy utilization.

The components of the TFSMP programme with regard to wood energy are:

- development of sustainable fuelwood sources by promotion of fuelwood resources and production and distribution of low cost seedlings;
- promotion of alternative rural energy sources, modern energy to wood deficit areas, R and D on non-conventional sources of modern energy and promotion of non-conventional energy;
- development and promotion of energy efficient devices, stoves, charcoal kilns and boilers and support to small scale industries to develop fuelwood sources; and
- promotion of biomass utilization. Thailand produces 4.6 million tons of paddy husk, 35 million tons of rice straw and 7 million tons of bagasse amounting to 16 Mtoe.

### **3.15.4 Recommendations to RWEDP**

- Technical co-operation among member countries should be in the form of direct exchange of technical information, experience, materials, equipment and expertise.
- Regional training programmes, training of trainers, training on rural energy planning, wood energy data base and wood energy planning are highly needed.
- Exchange of information on utilization of biomass waste materials and energy conservation in the domestic and industrial sectors could come under the FAO if the project is terminated.

## **3.16 Wood Energy Development in Vietnam**

*Prof. Ha Chu Chu, Director, Forest Science Institute, Ministry of Forestry and  
Mr Nguyen Duy Thong, Chief, Household Rural Energy Planning Department, Institute of Energy*

### **3.16.1 National Wood Energy Situation**

Of the total energy consumption, 69% is derived from biomass energy sources. Biomass plays an important role in households, small rural industries and in food and agricultural products processing industries. Wood fuel from natural forests is considered a free commodity.

### **3.16.2 Wood Energy Problems**

In Vietnam, a gap between demand and supply of wood energy exists.

### **3.16.3 Wood Energy Development Activities**

In Vietnam, three major programmes related to wood energy development are being implemented:

#### *Improved Cookstove Development Programme in Vietnam*

- R and D of new stove types suitable for different regions;
- setting up demonstration projects at different levels; and
- organizing a Working Board for implementing projects.

The target of the programme up to the year 2010 is to introduce improved cookstoves to 50–80% of the rural households, for saving 30–40% of biomass energy and reducing CO<sub>2</sub> emission up to 20 million ton/year (now 50 million ton/year).

#### *National Energy Policies*

These relate to:

- efficient utilization of national energy resources;
- formulating and implementing national sustainable energy development strategy;
- promoting R and D of NRES;
- integrating environmental protection and energy development; and
- introducing and applying the advanced technologies and experiences of the countries in the region.

#### *National Forestry Policies*

These relate to:

- establishing a law of forest development and protection (approved in 1990);
- reducing the demographic growth rate from 1.5% to 1%;
- allocating forests and forest land;
- promoting reforestation;
- developing social forestry;
- eliminating hunger and poverty in mountainous areas;
- fixing cultivation in mountainous regions; and
- promoting a tree planting campaign in the Delta and middle regions.

### **3.16.4 Recommendations to RWEDP**

- Strengthen the knowledge and capability of people in the wood/biomass energy field through meetings, workshops, training courses, publications, etc.
- Enhance and promote national wood/biomass energy development programmes.
- Unite different institutional activities on wood/biomass energy development for national purposes.
- Set up good opportunities for RWEDP member countries to learn from each.

## 4. WOOD ENERGY RESOURCES

*Tara N. Bhattarai, Wood Energy Resources Specialist, RWEDP*

### 4.1 The Wood Energy Resource Base

Some countries among the 16 RWEDP member countries (i.e., China, Indonesia, Myanmar, Vietnam) report they have made specific efforts to overcome the chronic problem of fuelwood supply shortages experienced by the people in rural areas by launching special programmes of large scale fast-growing fuelwood plantation establishment in forest deficit areas. Others have stated that their national programmes of massive afforestation/reforestation implemented under their respective community/social forestry development strategies have made a significant contribution to the expansion of the forest and tree covered areas. The prime objective of many of these programmes is to meet the basic needs of the poor and marginal farmers for forest products. Most of these poor people live in rural areas and can not afford the alternative commercial fuels available in the market. But in reality, whatever additional amount of wood is produced under these basic need fulfilment schemes, the bulk of the wood produced does not find a place in the kitchens or fireplaces of the poor people, but ends up mostly in wood based industries and sawmills, depending upon local demand for wood for competitive uses as well as the wood price in the market. The price the competitive end-users can offer may vary significantly, and the price people are willing to pay for fuelwood may often not be sufficient to take a major share in the market. Of course, whatever wood (i.e., branches, twigs, stumps, etc.) cannot be sold for other end-uses at higher prices will be used by people either locally or elsewhere as domestic or industrial fuels and part of it may even be traded commercially in local markets. Therefore, in most cases, whatever wood is being used locally in a majority of cases is a by-product and not a main product of the forest or non-forest area based production systems. From this perspective, there is no separate or distinct wood energy resource base in RWEDP member countries.

Fuelwood generated as a by-product constitutes an important output under the multi-purpose land and tree based production systems (i.e., community forest and plantations, private and farm forests, agroforestry, etc.). Although most of this wood may not be properly accounted for and no data may exist to reliably estimate its contribution to the total supply, some recently conducted studies from member countries suggest that its share is as high as 90% (in Pakistan), and the estimated average for the 16 RWEDP member countries is as high as two-thirds of the total woodfuel supply. The supply from forest areas accounts for the remaining one-third only, although its share in some countries may be much higher ( Bhutan, Nepal, Lao PDR, etc.). Of the residues that are being produced in some countries from commercial timber harvest ( Indonesia, Malaysia), a substantial amount is still being wasted in the forests, although recently efforts have been made to remedy this.

As woodfuel is mostly a by-product of other larger multiple objective production systems, or is a recovered product after commercial timber harvest (i.e. the non-commercial portion of the tree) in the forest. Therefore, woodfuel production enhancement programmes should be pursued together with other major sectoral activities, particularly non-forest land based production (i.e., agriculture, forestry, and other related sectoral development programmes). The strategy for woodfuel production enhancement may call for integration of trees into the farming systems, as well as into all other types of tree and land based production systems. The implementation of such integrated strategies calls for the effective co-ordination of the different actors and

activities in related sectors (forestry, energy, agriculture, rural development, etc.), as well as their long-term support for such strategies in programme implementation.

## **4.2 Regional/Sub-regional/National Level Activities**

### *Training Activities*

Two sub-regional training workshops on integrating fuelwood production into agriculture, forestry and rural extension programmes were organised during the first year of phase one of RWEDP. The first was held in Indonesia, in April 1995, for the eight South-East Asian member countries, including China), and the second was held in Bangladesh, in October 1995, in collaboration with BFD and BARC, for the seven South Asian member countries.

The course in Indonesia was organised in collaboration with FAO-APAN/FNCRDC, Bogor, and emphasised the integration of woodfuel production into agroforestry extension programmes. Besides the two representatives from the forestry and energy sectors, one additional representative each from member countries were invited to represent the NGO sector, mostly National Agroforestry Network Co-ordinators. The participants from China, Indonesia and Philippines presented case studies from their respective countries. RWEDP, APAN and ARECOP covered the specific issues of wood energy development, particularly from the perspective of its integration into farming systems (including woodfuel conservation).

The South Asian training workshop, on the other hand, tried to cover the whole gamut of issues related to wood fuel production in both forest and non-forest lands, as well as under government, community/social, and private forestry development programmes including agroforestry and rural extension. A review of the training curricula related to woodfuel production, flow and utilization in the sub-region was a component of the workshop. The experiences of Bangladesh, India, Pakistan and Sri Lanka was shared through their presentation of country case studies, whereas the sub-regional wood energy situation and other aspects related to the integration of trees into the farming systems were covered in RWEDP and APAN presentations. The current position of wood energy related education in the sub-region was addressed by a case study from PFI, Pakistan, which was specifically prepared for this workshop. Whereas an attempt was made to gain an understanding of the South-East Asian position through direct interaction with relevant individuals and agencies.

A case study was sponsored by RWEDP entitled, “the woodfuel scenario and policy issues in India” for use as a briefing material for the Foundation Course for All India Services Officers. This document is expected to be useful to other member countries in the sub-region (RWEDP, Field Document No. 49).

As a national level follow-up to these sub-regional courses, RWEDP has been sponsoring a number of national level training courses in member countries. So far, seven countries, i.e., Bangladesh, China, India, Thailand, Philippines, Sri Lanka and Vietnam, have successfully replicated this type of training exercise at the national level. Training course participants have expressed their appreciation for such training courses in all cases. These national training courses served to network the participants and resource persons from government and non-government agencies and training institutions and at both personal and institutional levels. These national level linkages may contribute positively in the dissemination of information and to programme planning and implementation in the future.

A large number of position papers and area specific case studies have been prepared to support these national training courses which now serve as an invaluable information source in different member countries. Similar activities are planned in four more countries (Bhutan, Indonesia, Lao PDR and Pakistan)

Among the other regional/national level activities that were carried out during the past years include an expert consultation on woodfuel trade in Asia, organised in October 1995 in Peshawar Pakistan in collaboration with PFI. Among the participants in the regional consultation were a large number of initial authors of RWEDP sponsored country case studies on "woodfuel flows", which were conducted during its previous phase. Together with these studies, summaries of two other case studies, one from Pakistan and the other from the Philippines, were also presented; these were derived from the UNDP/WB sponsored HESS studies under the ESMAP project. The consultation helped to enhance the awareness of participants about the complexity of the woodfuel flow systems and the intricacy of the systems functioning in specific country contexts. It also helped to identify two sets of activities for implementation at regional and national levels. Most country participants also came forward with national level pilot schemes for their respective countries, which included some national level follow-up training courses on woodfuel trade.

Pakistan and Myanmar are the first two countries to implement these national follow-up training courses on woodfuel trade. The course in Pakistan was organised in Peshawar by PFI, and the one in Myanmar at Yezin, by the Forest Research Institute of the Forest Department. Both courses took place in 1996. These training courses generated some 16 presentation materials in Pakistan and 8 in Myanmar (with 42 participants and 68 observers). Virtually every senior forest officer in Myanmar was associated with it. These courses have contributed positively to the development of the woodfuel sector in both countries.

The Institute of Forest Conservation, College of Forestry, UPLB, Philippines, has started integrating wood energy development related issues and topics into their on-going International Short Courses. So far three interns from the Institute have collaborated with RWEDP to identify the general as well as specific issues to be covered through the short courses offered under different titles. Preliminary work in this direction was initiated from late 1995 and since 1996 RWEDP has started sponsoring limited number of participants from a selected member countries to attend these courses (4 in 1996 and 2 in 1997). Some member countries did not respond to the call made to nominate participants. UPLB has also agreed to prepare a training "manual" on wood energy development, which will serve as a guide to the resource persons with these courses. Once published, the manual is also expected to be beneficial to other member countries.

The national training workshop on woodfuel trade in Pakistan laid the groundwork for conducting a national workshop in one of its southern provinces (Punjab) in 1997. The two active participants cum resource persons in the training course, one from the Agricultural University of Faisalabad and the other from the Punjab Forest Research Institute, expressed their joint interest in hosting a national training course on "integrating woodfuel production and marketing in forest, agriculture and tree production systems" in Punjab in October 1997. It is expected that RWEDP's assistance in the organization of such national training courses will continue in the coming years.

The regional expert consultation in Pakistan on woodfuel trade has resulted in the preparation of training material on the wood fuel trade. This document is currently in the final stage of preparation. It includes both basic information related to woodfuel as well as the specific

aspects of the flow system. It may also be useful to others in the region as a source of reference. Efforts should be made to continue to publish such documents covering specific aspects of wood energy development in other member countries.

Similarly, the Thailand national workshop revealed some useful information about the types and diversity of rural and home-based industrial, commercial activities of economic significance covering both rural and urban areas of Thailand. In order to make fuller use of this material a reporting framework was designed and passed on to RFD for collecting further material, and for explaining and presenting details of these activities along with photographs in the form of a printed document. The result will be a photo illustrated compendium of these activities. The first stage of document compilation is about to finish shortly. Similar activities may be conducted in other countries, if any of them show an interest.

### *Publications*

The regional and national training courses have contributed a number of summary reports in the form of Proceedings (where appropriate). The full texts of materials prepared for presentation in these courses have been included in these publications (e.g., RWEDP Report No. 21, 25, 26, 27). A number of additional reports are in the final stage of preparation (e.g. Bangladesh, Myanmar, Pakistan, Sri Lanka).

Two other publications, RWEDP Field Document 45 (Woodfuel Productivity of Agroforestry Systems in Asia) , and the FAO-RAP publication: 1995/38 (Trees Commonly Cultivated in Southeast Asia: An Illustrated Field Guide), partly funded by RWEDP, have direct relevance to wood energy resources development in the region.

## **4.3 Potential Areas for Future Collaboration**

1. During the national training courses a number of new areas have been identified for further studies, e.g. a study of gender specific roles in woodfuel flows in Kandy, Sri Lanka; woodfuel flow studies in Lucknow, India, and in Bogra, Bangladesh. These are still at the planning stage.
2. As in India, the need for a publication addressing the policy issues related to wood energy development is now felt necessary in the Philippines, since a system of Continuing Professional Education has been recently made mandatory by the Professional Regulation Commission for actively practising professional foresters. The Institute of Forest Conservation, College of Forestry, UPLB has been accredited to conduct these training courses in the future. RWEDP should offer its assistance to UPLB in support of this new task which could positively contribute to wood energy development in the Philippines.
3. The economics of woodfuel production under dedicated fuelwood plantations and/or integrated, multipurpose production objectives is a potential area for study.
4. The study of the 'safety net' role of public forests and community lands, specifically from the point of view of their free access to political refugees and displaced persons would be a useful contribution to the wood fuel literature. Such land provides opportunities for collection and market trade of woodfuel in certain problematic area and helps to generate income and employment.

5. The other countries which may conduct national training courses on woodfuel trade include Bangladesh, India, Nepal, Philippines and Sri Lanka.
6. As far as possible, RWEDP has tried to link with other relevant existing regional and/or national programmes and institutions to expand its network of wood energy development expertise in Asia. This strategy of establishing linkages between GOs , NGOs and POs should continue in the future.
7. The need for identification of training curricula on wood energy development followed by preparation of a text book on wood energy in Asia is evident. This task, as far as possible, should be pursued in collaboration with one of the reputed forestry training institutes of RWEDP's member countries. If other regional forestry/training projects show an interest in collaborating they should be invited to participate in this task.
8. RWEDP should expand its linkages with the agriculture sector which is an important contributor to non-forest area based woodfuel production.
9. RWEDP should collaborate in information dissemination to highlight the role and importance of forests (e.g., tree and shrubs) in CO<sub>2</sub> (a greenhouse gas) emission, absorption and storage, particularly from the point of view of world climate change.

#### **4.4 Commonly Observed Issues and Constraints**

1. In most areas, the major concern is not the availability or quality of woodfuel, but its distribution to the needy. The problem of distribution is further complicated by the low economic status of a majority of woodfuel users. Traded woodfuels and conventional fuels do not serve the energy needs of the poor and marginal farmers of rural areas, so their search for free supply sources will continue in the near future. This is a major problem in terms of equity and poverty alleviation.
2. The impact of woodfuel shortages will be felt more directly by rural women and children, in terms of managing an alternative fuel supply from available sources. Greater hardship and risk to health as a result of increased distance to collection sources and the poorer quality of alternative fuels may have to be borne to ensure a stable supply of household energy.
3. The institutional responsibility for wood energy development is not yet clear in most countries. Most, if not all, arrangements that exist today reveal institutions to have overlapping roles and no clear mandate for avoiding work duplication and ensuring co-ordination (i.e., between national planning, finance, energy, forestry, agriculture, rural development related agencies). This does not support the full integration of trees into the farming system or the development of modern wood/biomass energy.
4. Most countries still face chronic problems related to land and tree ownership/tenure; unrestricted production, harvesting/conversion, movement and trade of privately owned/produced wood products. The cost of buying felling/transportation permits, numerous check points en-route, road and other transport taxes, and many other taxes discourage private sector investment and participation in the development of and trade in woodfuels. These issues have been known to exist for a long time but due to limited or lack of political commitment, they remain unresolved.



5. Technical information flow and support with needed inputs to private tree growers is still weak in the region. In recent years, the need for management of homegardens/homestead trees as a priority activity has been identified in some member countries. A new project to service the private sector in its efforts of homestead/homegardens tree development has been initiated in a few countries (e.g., Bangladesh), but most of the traditional farming systems that integrate trees into the farming systems seem to be operating on their own with no or only marginal support from the concerned sectors, in spite of the fact that these trees contribute diverse products and services to the owners and the economy.
6. Support should be made available to the private sector in its efforts to integrate multipurpose tree species into the farming system on a much expanded scale. Information related to R and D and marketing for wood and woodfuel will be necessary to successfully implement the strategy of integrated wood fuel production.

The other issues related to wood energy development in the region are how to reach the large number of wood fuel producers and consumers who often operate as an informal sector at the grassroots level. Whatever services public sector agencies are providing are hardly noticeable, and there are many gaps and weakness in their provision. Possible contributors to wood energy development at the grassroots level, particularly in mobilising and informing community groups and farm households, could be the NGOs. But, in spite of their growing number in recent years in most member countries, they do not get a fair chance to participate in most RWEDP sponsored activities, even if their participation is intended and invitations are sent through country focal points. The need to improve this situation in the future calls for serious attention.

## 5. WOOD ENERGY DATA AND PLANNING ISSUES

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### 5.1 Wood Energy Data Collection

Inadequate wood energy data and information (defined as a lack of data and information or erroneous data and information, or both) have led to erroneous formulations of wood energy situations and problems creating many misconceptions about wood energy. Examples of these are as follows: wood energy use is the main cause of forest denudation in the region; fuelwood is obtained by cutting down trees from forests; fuelwood is only used for cooking by poor rural families; fuelwood use will continue to increase linearly with population increases; the use of fuelwood will disappear as the economy of a country grows; charcoal production always lead to deforestation; and wood energy problems are the same everywhere.

#### 5.1.1 RWEDP data collection and assessment activities

In the current phase, RWEDP has tasked itself to lead efforts in the region to intensify efforts to improve data and information on wood energy and to provide a better understanding of wood energy systems. Since the project has started it has done the following:

##### *Developed a Framework for a Wood Energy Data Base*

This framework identified the types of data required and the specific parameters to be used for policy analysis, planning, and program formulation. It also included a “wood energy balance table” format to help facilitate the inclusion of wood energy in overall national energy balances. The framework identified the following types of data: socio-economic data, sectoral wood energy consumption data, wood energy flow data, wood energy technology data and wood energy resource data.

##### *Reviewed and Organised Available Secondary Data*

Although the data collected were mostly macro-level socio-economic, energy and forestry data, and were not complete for all countries, this is a significant work (RWEDP Field Document no. 47). The published results contain country-by-country data that show variations in wood energy situations across countries. It contains information on production, flow and consumption of wood energy; and the factors that influence these, providing insights into the complexity of wood energy systems.

##### *Identified “Best Estimates” of Wood Energy Consumption Data*

Efforts were made to obtain time series energy consumption data for each country from various official national and international energy data bases. Efforts were also made to collect data on factors that affect consumption such as national income and population. More importantly, information were also obtained on how these data were collected. RWEDP assessed these data and determined “best estimates” and used them for analysing wood energy consumption in the region country-by-country.

Efforts were made to assemble more detailed data on wood energy supply that would acknowledge non-forest sources of woodfuels and the differences in wood resource potential resulting from variations of agro-ecological situations across a country. RWEDP formulated its own assumptions for extrapolating detailed data on wood resources and production for wood energy for each country. The results were used for a country-by-country analysis of wood energy supply.

#### *Initiated Regional-level Institutional Linkages*

RWEDP linked up with other institutions doing similar regional-level data collection exercises. Aside from the FAO Forestry Statistics Section and FAO-RAP, RWEDP reviewed the data collection activities of other institutions such as UN Statistics Office (particularly ESCAP publications), WB-ESMAP, IEA, WRI, AIT, APDC, AEEMTRC, APERC and ADB. It appears that all institutions are generally doing parallel activities, however a closer analysis of each institution's activities reveals specific differences and more importantly, possible gaps in terms of collecting needed wood energy data.

#### *Conducted Training Activities*

Two of the reasons why data on wood energy is inadequate are the improper techniques and methods for data collection and the lack of resources (particularly funding) to conduct data collection activities. RWEDP is currently trying to address these issues through a combination of regional training, follow-up national training and case studies. At the very least, RWEDP hopes to lay down a framework and identify the basic procedures needed to improve data on wood energy.

These RWEDP activities have generated more and better data in the last two years to help in improving our understanding of wood energy. The process has physically brought to the RWEDP office in Bangkok perhaps all publications carrying wood energy data that are currently available. RWEDP was able to retrieve from them the relevant data, indicators and parameters and have organised these into a system using the RWEDP wood energy data base framework. RWEDP is now in the process of putting them into a computerised data base.

### **5.1.2 Issues in national-level data collection and management**

The exercise has also allowed RWEDP to do a detailed review and analysis of available data, to gain knowledge of the specific tasks other institutions (both national and regional) are undertaking, to assess the quality of their data, and to identify gaps and weaknesses in current national-and regional-level activities relating to collecting and managing wood energy data. These led to the identification of the following issues in national wood energy data collection and management.

#### *Wood energy consumption data*

Available wood energy consumption data are limited to household consumption data. Most wood energy utilization data reflect only data on the consumption of wood energy in the household sector and only a few countries have data on wood energy consumption in the non-household sectors.

Moreover, only a few countries are regularly collecting primary data. Some have one-time national energy consumption surveys. In some other countries, the aggregate consumption figures reported have been extrapolated based on the assumption that there is a linear relationship between total wood energy consumption and total population (some countries use FAO data which were generated using the same methods). Only very few countries (e.g. Thailand) periodically conducts primary energy consumption data that include factors that affect wood energy consumption.

Most data are extrapolated from project-or program-level data collection activities. The results of area-based project- or program-level studies are usually used as the basis for extrapolating aggregate national energy consumption data. This is an erroneous approach as the wood energy situation varies from place to place.

Data collection techniques have numerous potential sources of error. Data are usually obtained through interviews which can be unreliable, especially if no physical measurements are taken to check the results obtained from the interviews. In only a few countries (Pakistan, Philippines and India) is information available which discusses the techniques and methods used to avoid these potential errors in wood energy data collection.

#### *Wood Energy Supply Data*

Data on wood energy resources are very limited. In almost all countries, data on wood energy resources are taken to be synonymous with data on forest cover areas or the volume of forest trees (usually measured as stem volume). As such, the data underestimate the resource potential because they do not account for woodfuels from trees outside forests, the crowns of trees in the forests, and the wood waste generated from the harvesting, transport and processing of wood. Furthermore, factors that restrict supply such as access rights, difficulty of terrain and social practices are also not accounted for.

No commonly-accepted wood energy supply data collection techniques exist. Only in Pakistan has there been a comprehensive study that systematically collected wood energy resource data. This provided precise but relatively costly techniques for generating data. A similar exercise was done in the Philippines but it used assumptions and approximations based on secondary data from area-based studies of localities of similar agro-ecological conditions. This approach cost much less but left questions regarding the accuracy of results.

The concept of wood energy flow is still not widely understood. Except again for Pakistan and the Philippines, national aggregate data on wood energy flow is non-existent. However, again, there are data available from many area-based studies, many of which were studies supported under the previous phase of RWEDP. However, care must be taken in using them to obtain national aggregate figures.

Wood energy technology data are not yet systematised. Wood energy technology data are available from area-based surveys, demonstration projects and laboratory studies done in the past decade. A system to organise these data has not been commonly defined yet leading to different perceptions and interpretation of data. Again, care must also be taken in using them to obtain national aggregate figures.

### 5.1.3 Issues in regional-level data collection and management

At the regional-level, the main interest is to give a broad picture of the regional wood energy situation; trends in consumption, sustainability of supply, socio-economic impacts, trends in technology developments and possibly environmental impacts. The end objective is to give policy advice to countries. The following points are some of the major issues in regional-level data collection activities:

- Limited wood energy data hinder proper and in-depth policy advisory work. Most of the previously mentioned regional and international institutions doing policy research and advisory work obtained their wood energy data from the data published, or reports submitted, by countries. Otherwise, they get data directly from WB-ESMAP and FAO studies. They also do their own extrapolation studies if the data submitted by the countries contains data gaps. Except FAO, and some studies conducted by WB-ESMAP, most data published by these institutions consist of wood energy consumption data only and wood energy supply data is absent. This is just a reflection of the fact mentioned earlier that only consumption data are available from countries.
- There is a need to improve projection techniques to correct misconceptions about wood energy. FAO is the only international organization that publishes yearly country-by-country wood energy consumption data. FAO extrapolates total wood energy consumption by assuming it has a constant linear relationship with total population. FAO also still use 1961 as base year for extrapolating yearly values of consumption. Most data generated by FAO on wood energy consumption do not come directly from national data reports. However, this approach is also common at the national levels.
- Support for continuing improved data collection activities has declined. Intensive expensive wood energy data collection is a part of past WB-ESMAP studies of the traditional, rural or household energy sub-sectors. The studies are not meant to be regular data collection activities. They are one-time exercises meant to gather data and information to be used as a basis for formulating policies to restructure a country's energy sector. WB-ESMAP has apparently stopped even this one-time type of in-depth energy sub-sector study.
- Regional-level wood energy data collection and management is insufficient. No regional or international organizations, except RWEDP, currently collect, organise and publish data on wood energy resources, flow and technology. Although some international organizations have wood resource data, like some countries, they erroneously equate wood energy resource data with forest resource data. Wood energy technology data, particularly data on process and equipment design, efficiencies and costs are still scattered in many regional and national research and technology development institutions.
- A universal Wood Energy Data Base Format may be necessary. Organising an international or regional wood energy data base will have to overcome the lack of uniformity in definitions of terms, collection techniques, parameters and indicators, and conversion factors, among others. There have been limited initiatives for regional-level, or even national-level, assembly and management of data for assessment and analysis activities.

## 5.2 Wood Energy Planning

Broad-based wood energy development programmes which aim for the efficient, economical and sustainable supply and utilization of wood energy, can be viable energy policy and strategy options for many countries in Asia. Formulating broad-based wood energy development programmes involves an integrated analysis of supply and demand for wood energy. Defining policies and strategies would require the incorporation of wood energy assessment and analysis in energy planning and in other relevant sectoral planning exercises such as in forestry and agriculture.

### 5.2.1 Issues in wood energy planning

#### *Project-Level Planning*

Past wood energy interventions/activities have been mainly at the project level. In some countries, wood energy projects are combined together into a program. As such, wood energy planning in the past dealt mainly with project or program planning. Wood energy project and program planning concepts have been continuously developed, disseminated, implemented, dissected, discussed and reformulated. In the process, project and program planning approaches, techniques and methods have been continuously fine-tuned.

This is particularly true for wood energy projects and programs in areas such as woodfuels in community forestry, agroforestry, tree farming, improved cookstoves dissemination and lately, modern wood energy applications. Several regional and national institutions have been continuously involved in such projects and as such are continuously generating experiences on how to plan and manage such projects. There is a need to disseminate to wider audiences, particularly to those at the grassroots levels who are directly involved in wood energy undertakings as part of their daily activities.

#### *National-Level Planning*

Wood energy analysis is not a part of macro-level or sectoral planning exercises in many countries. These planning exercises are important because they are the basis for formulating national policies and strategies, the most important of which are allocation of government investment and resources, and prioritization of development objectives and targets. Wood energy analysis should be part of overall energy or forestry planning activities.

Most countries have recognised the importance of including wood energy analysis in energy and forestry planning exercises. Some countries which are assisted by RWEDP (i.e. Cambodia, China, Philippines, Sri Lanka and Vietnam) are starting to integrate wood energy into energy planning. The focus of these initiatives is to improve planning approaches, techniques and methods to properly integrate wood energy into macro-level energy planning exercises through case studies.

These activities are undertaken only by middle-level agencies tasked with rural or renewable energy development. These activities need to be properly acknowledged to sustain efforts to institutionalise the integration of wood energy into macro-level planning exercises. There is a need for these activities to be recognised, validated and supported by higher-level energy, forestry and agriculture agencies.

### *Decentralised Area-Based Planning*

Wood energy situations and problems are site-specific. They vary from country to country, from province to province, or state to state, within countries. Even within states or provinces, wood energy situations and problems may be different. Thus, it is improper to generalise about wood energy situations or the solutions to wood energy problems. A decentralised area-based approach is essential to properly understand wood energy situations and to formulate proper site-specific plans, policies and strategies.

There is a need to develop techniques and methods for decentralised wood energy planning and disseminate their application to countries seriously committed to implementing wood energy development programmes. RWEDP is supporting case studies in various countries (China, Philippines and Sri Lanka) to develop country-specific approaches to decentralised area-based wood energy planning.

Again, as these activities are undertaken only by middle-level agencies tasked with rural or renewable energy development in co-operation with locally-based institutions, there is a need for these activities to be recognised, validated and supported at higher-levels to expand efforts and institutionalise decentralised area-based approach to wood energy planning in other local areas.

#### **5.2.2 Wood energy planning problems**

Wood energy planning exercises, whether it is project planning, or integrating wood in macro-level planning or decentralised area-based planning face the following problems:

##### *Inadequacy of Wood Energy Data.*

This is a major factor that leads to the inappropriate integration of wood in energy or forestry analysis, and limits decentralised area-based wood energy planning exercises. The problems, issues and RWEDP initiatives to strengthen national capacities have been previously discussed.

##### *Improper or Lack of Understanding of Wood Energy Systems.*

This leads to erroneous concepts, approaches and techniques in wood energy planning, examples of which are given below:

- the application of the “gap theory” that leads to inaccurate prognosis of wood energy situations and problems;
- inadequate analysis of wood energy systems that leaves out elements such as factors affecting fuel shifting and consumption, consumption of non-households, non-forest wood fuel resources, and wood fuel flow aspects; and
- generalization of wood energy situations that leads to centralised planning approaches and techniques and consequently to generalised policies and strategies.

##### *Weak or Lack of Linkages Among Relevant Agencies.*

Energy and forestry agencies are the key agencies which must link together. They need to:

- identify overlapping and gaps in wood energy planning activities;
- identify their current weaknesses that prevent proper wood energy planning; and
- define and agree on the responsibilities of each to strengthen national capabilities.

### **5.2.3 Issues in developing national capabilities**

#### *Experiences in Regional Training Activities*

RWEDP conducts training activities focused on wood energy data collection and planning. Regional training activities are implemented with the assistance of regional institutes. The first training was implemented with the assistance APDC, the second and third with the assistance of AIT. Two more regional training are scheduled to take place before RWEDP ends in 1999.

The three regional courses implemented so far have involved about a hundred participants. These participants were trained on concepts, approaches, and methods in three levels of wood energy planning exercises as follows:

- integration of wood energy planning into macro-level energy planning and other macro-level sectoral planning exercises, particularly in forestry;
- wood energy in decentralised area-based energy planning; and
- planning for wood energy production and utilization projects.

During these training activities the participants were given the opportunity to initiate links between the institutions they represented. The participants were given the opportunity to jointly:

- learn concepts, approaches and techniques for wood energy planning;
- undergo training exercises on wood energy data collection and planning;
- discuss with each other their wood energy-related tasks and activities and relate them with the concepts and techniques they learned from the training course; and
- analyse what needs to be done to develop or strengthen wood energy planning capabilities in their respective countries, particularly in building institutional linkages.

Bringing together forestry and energy agencies to discuss wood energy and, in particular, wood energy planning, is a major RWEDP achievement. RWEDP has actually been encouraging the organization of inter-agency National Wood Energy Committees in the member countries to facilitate institutional linkages. This has met with various degrees of success among the countries. However, it is the participation of representatives of energy and forestry agencies in RWEDP regional training activities that have provided an apparently effective venue to develop the necessary institutional linkages for wood energy development.

At the end of the regional courses participants have proposed activities to initiate institutional linkages in their countries. They have also identified activities needed to develop national capacities in wood energy planning and identified which of these activities need RWEDP support.

However, the more important thing is to implement the follow-up activities identified by the participants upon returning to their respective countries. A few countries have done this, but most have not. The reason seems mainly due to the types of participants sent to the training course:

- participants are not technically qualified and as such not technically capable of properly identifying and formulating follow-up activities;
- participants are too junior in rank to initiate initiatives in linking institutions and follow-up training activities upon returning back; and
- participants come from agencies whose work is not relevant to wood energy data collection and planning and as such there is no interest in conducting follow-up activities.



It appears also that only a few of the nominating agencies provide post-training evaluation of their representatives' participation in the training courses. They evaluate how concretely the training course can help develop national capabilities. In a few countries that conducted such post-training evaluation, the need to initiate follow-up activities was discussed at the proper levels and appropriate actions were taken. The countries then communicated back to RWEDP to ask assistance in organizing the follow-up activities.

In view of the above-mentioned experiences of RWEDP in its efforts to build-up national capacities and institutional linkages, it poses the following questions to the country representatives:

- How can participation in regional training courses be made more selective?
- How should initiatives for national follow-up activities be encouraged?
- How can support for national activities be generated from the proper authorities?

#### *Need for National Follow-up Activities*

As previously mentioned, it is desirable that regional courses be followed-up at the national level. National level activities may include national training courses and case studies as described below:

- National training courses, which are conducted using the national language of the country, are implemented in co-operation with national agencies already involved in rural or renewable energy planning activities.
- Case studies are also being implemented with the co-operation with the same national agencies. There are two types of case studies conducted: area-based planning case studies for decentralised wood energy planning exercises and macro-level planning case studies to integrate wood into energy planning exercises. Both case studies use the LEAP model as the planning tool. Area-based exercises include selected primary data collection activities while macro-level exercises use only secondary data.

These training courses are designed to provide policy analysts and planners with a clearer understanding of wood energy planning concepts and the different wood energy planning techniques and methods. The case studies are to provide on-the-job training on wood energy data collection and planning. Based on the results of these national follow-up activities, RWEDP will develop broad guidelines for sustaining capacity building activities in wood energy data collection and planning.

The experience gained by RWEDP in conducting training activities has led to clearer and more focused concepts of wood energy planning. The approaches and techniques needed for wood energy planning are now better understood and, as a result, more defined materials for such are now available. However, most are still concepts and actual applications and generation of practical experiences are needed to validate and fine-tune them. These hopefully will be initially achieved by the case studies.

## **Box 2: Energy Modeling Techniques**

A technique used in decentralised planning and macro-level sectoral planning exercises is computerised energy modelling analysis. RWEDP has adopted the LEAP (Long Range Energy Alternatives Planning) energy planning model as tool to be used in the modelling exercises.

### *The LEAP Model*

Most macro-economic models used for energy planning cover only energy demand and they are based on the assumption that energy demand is driven by macro-economic parameters such as population, GDP and energy prices. Forecasts of energy demand are based on established relationships (so-called elasticities) between these parameters and energy consumption. Since patterns of wood and biomass energy consumption are very site-specific and largely non-commercial, these models are inadequate to incorporate wood and biomass energy.

The Long-range Energy Alternatives Planning model (LEAP) aims to overcome these limitations by analysing energy consumption by end-use (e.g. cooking) and by including a biomass module that allows for the evaluation of biomass resources and the availability of these resources for energy purposes. Because of its flexible data structure that can incorporate all types of energy end-uses and fuels it is appropriate for use at both national and sub-national level and it can be applied even when limited data are available. It is user-friendly and can be run on a simple PC.

### *National Follow-up Activities: Issues and Constraints*

Only five countries (Cambodia, China, Philippines, Sri Lanka and Vietnam) have conducted or have definite plans to conduct national follow-up training courses. The same countries are conducting or planning to conduct case studies. RWEDP has received initial proposals from a few more countries (Thailand and Lao PDR). Many other countries (represented by the participants from the regional training courses) have expressed their interest in follow-up activities. It would be useful to have more concrete indications from countries seeking RWEDP's assistance to conduct national follow-up training activities.

The case studies to be conducted in several countries may open up new questions related to wood energy planning and could lead to reformulating approaches and revising techniques and methods that have been developed for wood energy planning so far. These will generate debates, discussions and probably further research and case studies. The resolutions to these will have to be addressed at a time when RWEDP has already ended. Which of the activities involved in national capacity building are countries capable of handling by themselves? Which will need external assistance?

A regional body may be needed to take up some of the regional-level responsibilities currently taken on by RWEDP, including the provision of expert advice and resources to countries. How many countries need such regional support? Are there other areas where regional support is needed? Are there regional institutions which can assume these roles when RWEDP ends? All these questions remain to be answered.

Though the conventional thinking is that countries in this region are moving towards less government intervention, the reality is, policy-making and planning are still very much top-down processes in most of them. Decentralization is advocated in many sectoral development programs but the need is to translate it in to actual practice. Appropriate approaches and techniques need to be adopted but, more importantly, so do appropriate institutional set-ups and social norms. Country-specific mechanisms have to be evolved to overcome the difficulties encountered. The actual situation in each country with regards to the role of government in planning and the extent of decentralization will be the major factor that will shape country-specific wood energy planning concepts and approaches. How can these factors be taken into account in developing national capabilities in wood energy planning?

## **5.3 Strategic Issues in Building Capacity for Wood Energy Planning**

The next two years will see RWEDP expand its initiatives in national capacity building to more countries. What RWEDP can do is initiate activities that lay down a framework and guidelines that define the basic tasks for national capacity building. RWEDP will not have the resources and time to provide support and guidance for the full implementation of these tasks, particularly when consolidation is what is already being aimed for in the countries. Many of these tasks and activities will go beyond the remaining period of RWEDP's existence. Without regional institutions to take over RWEDP's role, there is a danger that activities initiated by RWEDP may fizzle out. Which institutions are capable of filling the void when RWEDP is gone? What can RWEDP do to address this issue from now till the end of the project?

### **5.3.1 Need for regional capacity building**

The establishment of a permanent regional body that will provide the lead role and expert advice in formulating the activities for strengthening national institutions is desirable. The

regional body would be responsible for the following activities which are currently handled by RWEDP:

- formulating the training concepts and consultation meetings at regional and national levels;
- providing expert advice in formulating and monitoring national activities;
- documenting and analysing the various country experiences;
- disseminating information on and assessing the countries' experiences; and (possibly),
- providing seed funding for institution building activities.

Several regional institutions appear to have the potential to perform the current activities of RWEDP, although perhaps not at the same level of intensity. They can hopefully consolidate, in the future, the achievements made by RWEDP. Each has its own strengths and weaknesses. These regional institutions include FAO-RAP, ESCAP, AEEMTRC and APDC. The FAO-RAP mandate will restrict it to activities relating only to the wood energy supply side. AEEMTRC covers only the ASEAN countries, though its mandate may allow it to do all tasks related to WED except that of wood production. APDC is more of a research institution and is hampered by its limited number of staff. ESCAP has the mandate to cover all aspects of WED and its members include all 16 RWEDP member countries, as well as various non-member countries where WED can be an important issue. ESCAP is currently aiming to downsize the organization and prioritise its activities. It could be an opportune moment to decide if wood energy is one of its priority concerns.

All of these institutions need to build-up their understanding and expertise in wood energy systems to effectively take-over RWEDP's current tasks. All need to mobilise additional funding and resources to be able to perform these tasks. Many of RWEDP's current tasks will be additional responsibilities for them. Some of the tasks are "developmental tasks" which means they need to be implemented only for shorter periods of time. Others will become "normative tasks" and as such can become part of the routine tasks of a regional developmental institution.

The "developmental tasks" which are currently handled by RWEDP include:

- overseeing capacity building of regional institutions to implement wood energy training courses;
- providing directions and expert advice to national agencies in conducting national training activities, pilot projects and case studies;
- assessing, analysing and evaluating the national activities;
- documenting the results and disseminating them through seminars, workshops and publications; and
- fine-tuning approaches, techniques and methods for WED based on actual experiences of countries.

Sustaining institutional-strengthening activities in countries will be a major task of the regional body. In addition to this, some other RWEDP activities that may need to develop into the routine tasks of a regional body include:

- collection and publication of relevant indicators for wood energy;
- preparation and publication of annual regional wood energy situations;
- prognosis of future regional wood energy scenarios; and
- information dissemination related to developments in wood energy.

Linking wood energy development to other sub-sectors like biomass energy, renewable energy, rural energy and to other programs such as environment, gender, poverty alleviation and income generation may prove to be a very desirable regional development endeavour. It may

also prove attractive to donor agencies such as UNDP who might provide financial support for such a broader-based program. Under this scenario, ESCAP, because of its wider mandate, and because it includes the largest number of RWEDP-member countries, appears to have an advantage over the other regional institutions mentioned.

Does RWEDP then have to address the issue of “which regional-level activities need to be continued and which regional institutions are best placed to carry-out such activities”? What is RWEDP’s task in this regard in the final two years of the project?

### *Continuation of Training Activities*

Despite the number of training courses that RWEDP will be implementing during the project period, there will still be a need for more of such short training courses in the region. The reasons for these are as follows:

- the number of participants of these training courses is still small compared to the number of people to be trained, especially when the need to adopt decentralised strategies is considered;
- there is a need to organise follow-up in-depth training courses since most of the present training courses include only basic and introductory concepts; there is a need to validate concepts with actual experiences and develop from them more practical approaches;
- there is a need to develop training packages using national languages as many potential trainees are local people with little knowledge of English; and
- there is a high turnover rate of staff in agencies working in the field of WED.

Organizing such courses will require significant resource inputs from the institutions. RWEDP now provides these resources which include expert advice, training materials and funding for the implementation of the training courses. Funding includes travel costs and living allowances for the participants and honoraria for resource persons and experts. The total cost of these resource inputs could be substantial for the institutions to bear.

The training institutions RWEDP has co-operated with to implement regional training courses, notably AIT, offer degree programs. As such, they can incorporate into their degree programs wood energy planning subjects. With the incorporation of wood energy into relevant curricula, the institutions will hopefully turn out graduates already knowledgeable about wood energy. Although the effects will not be felt immediately, training students on wood energy as part of their degree program can be a cost-effective long-term strategy for building and sustaining the expertise required. This can be the long-term strategy for human resource development in the region. RWEDP is now planning to develop training materials that may be used in relevant degree programs.

To summarise, regional institutions face two main constraints if they take over the tasks of implementing wood energy training activities, whether they plan to conduct short training courses or to incorporate wood energy concerns into their existing degree training programs. These constraints are: the expertise available to them is still inadequate to effectively implement wood energy training, and the financial support required to build-up their capabilities and implement training courses when RWEDP ends is uncertain.

## 6. ISSUES AND OPTIONS FOR WOOD ENERGY CONSERVATION ACTIVITIES

*Auke Koopmans, Wood Energy Conservation Specialist, RWEDP*

### 6.1 Background

Biomass energy, including wood, has been and still is an important source of energy for all types of applications. This situation is expected to remain for the foreseeable future. Important reasons for this phenomenon are that biomass energy is available almost everywhere on earth, it is relatively cheap, it is virtually inexhaustible, it is renewable and, when used properly, is environmentally friendly. Rough estimates of the amount of biomass grown annually show that, in terms of energy content, the amount is equivalent to about 2,890 Exajoules ( $10^{18}$ ). Annual biomass production is therefore about 8 times the total annual world energy consumption, estimated at about 359 EJ, from all sources combined (EREC, 1995).

Although biomass appears to represent a very large potential source of energy, it has to be noted that a large part is not available. This is caused by various factors, notably, being inaccessible, being expensive in comparison to other sources of energy, having competing uses, etc. In the latter context often the 5 F's are quoted e.g. biomass can be used as Food/Fodder, Fibre, Feedstock, Fertiliser as well as Fuel. All factors combined create a situation whereby only approximately 270 EJ out of the total amount can be considered as a potential sustainable supply of biomass energy at competitive prices (Hall et al, 1992). This amount would be equivalent to over 70% of the total amount of energy consumed on a world-wide basis in 1990.

However, judging from official statistics, the share of biomass energy in the overall amount of primary energy consumed on a world-wide basis is much lower, therefore leaving scope for a more intensive use of biomass as a source of energy. The World Energy Council quotes a figure of approximately 12% as being the share of biomass in the total amount of primary energy used on a world-wide basis (WEC, 1994). Even though data for regions and individual countries show considerably higher amounts (South Asia about 50%, Latin America 30%, Nepal 95%, Myanmar 80%, Bangladesh 65%), it can safely be assumed that in most cases these data are an understatement of the importance of biomass energy.

An important property of biomass is its versatility, e.g. it can be burnt directly to provide heat, it can be converted to electricity, to liquid or gaseous fuels, it can be stored, etc. In many respects it can be compared to fossil fuels. However, the energy content of biomass, ranging from about 17-20 GJ/ton dry is low in comparison with fossil fuels such as coal (23--33 GJ/ton depending on quality) and 38--40 GJ/ton for liquid fossil fuels. Another common property of biomass is that it is often moist if not outright wet, has in general a low weight to volume ratio and is often scattered over large areas. Consequently, the costs of collecting and transporting it can be quite high while the need for processing (drying, crushing, compacting, etc.) adds to the constraints on its use. The lower energy density of biomass as well as its moisture content and the need for processing therefore does play a significant role in cost evaluations, in particular where large quantities are required.

## 6.2 Biomass Energy Applications

Being versatile results in it being used for many varied applications. Such applications can be loosely divided into “traditional” and “modern”. RWEDP considers that modern applications basically cover clean, convenient, efficient, reliable, economically and environmentally sound applications which are or can be used on a sustainable basis to substitute conventional sources of energy such as coal, oil and gaseous fuels. Examples are not limited to heat and electric power generation from biomass but also include domestic applications such as improved cooking and heating stoves. Besides direct combustion, liquid fuels from biomass such as ethanol, methanol, biodiesel, etc., gaseous fuels from biomass like gasification, biogas, etc. are also considered as modern applications as long as they fulfil the criteria indicated earlier. Incidentally, most of these modern applications are relatively large scale and therefore require considerable investments, with the exception of the modern domestic applications which generally require minimal investments.

Traditional biomass energy systems, by implication, will then, broadly speaking, mainly be confined to applications which do not fulfil the conditions given above. These traditional applications are often relatively small scale and energy supplies are frequently collected by the users themselves or are traded in a formal or sometimes in an informal manner (barter trade, etc.). The use of fuelwood for cooking and space heating as well as for small scale industrial use (brick burning, lime burning, food processing, etc.) as is common in many countries in the developing world, are some typical examples of traditional biomass energy applications.

However, it has to be noted that such a division into “modern” and “traditional” is arbitrary. Small scale CHP/Co-generation applications replacing conventional sources of energy, are both “traditional” and “modern” applications. In terms of scale they would be placed in the traditional category but in terms of their energy and substitution potential they would be considered modern. Biomass energy has in the past also been used for large scale applications including the combination of power and heat through steam engines with waste steam being used for drying purposes and plant oil has been used in the past as fuel for diesel engines, etc. Both are ranked here as “modern”. However, the reason for ranking them “modern” is that in most cases such applications are now reappearing on the energy scene in an upgraded form and are considered to have an important role in energy supply. Many of these once traditional applications almost disappeared as other fuels which were considered to be more convenient became available. This shift to fuels which were considered to be more convenient and often also more modern or progressive, resulted in technological development in the field of biomass energy sources coming almost to a standstill.

The situation started to change in the seventies and eighties after the “oil shocks”, when many people became concerned about the dependence on energy imports. Besides the concerns about high costs and dependence, there were other, more positive, factors which had, and still have, an influence on this shift even though energy planners and the end-users such as industries did not give much thought to these. These factors consist basically of the environmental aspects of wood and biomass, particularly their positive contribution to controlling global warming. If used in a sustainable manner wood and biomass are carbon neutral.

### 6.3 Biomass Energy Shares

In comparison to traditional biomass, the share of modern biomass is still low (only about 11–12% of all officially recorded biomass energy use), especially given the fact that the statistics on traditional biomass often understate its importance. The shares of modern and traditional biomass energy as well as those of the “new” renewable sources of energy are shown in table 3. This table shows that, based on total primary energy consumption data from 1990, modern biomass energy applications still have a long way to go before they are more important than the traditional sources of energy. The same is true for the “new” renewables such as solar and wind energy which account for an insignificant amount in comparison to both biomass energy as well as conventional sources of energy.

As indicated earlier, one difference between traditional and modern uses of biomass concerns the level of monetization. The decision to use “modern biomass energy applications”, in almost all cases, involves a decision where economics is an important factor e.g. end-users normally make a conscious decision between biomass energy and conventional sources of energy based on their respective costs. This is in contrast to end-users of traditional biomass energy applications whose lack of economic resources means that they rarely have a choice of which fuel to use. This is particularly true for the domestic sector and to some extent for small scale industrial applications (at village level, etc.).

**Table 3: Use of renewable sources of energy by regions (in Mtoe)**

Region	“New” Renewable Energy	Modern Biomass	Traditional Biomass	Large Hydro	Renewable Energy Total	Total Energy Mtoe	Renewables as Perc of Region	Renewables as Perc. of Global
North America	12	19	38	127	196	2,157	9.1%	2.2%
Latin America	3	46	125	80	254	577	44.0%	2.9%
Western Europe	10	10	20	99	139	1,462	9.5%	1.6%
Central/East Europe	5	10	30	55	100	1,739	5.8%	1.1%
Mid East and Africa	2	5	162	14	183	583	31.4%	2.1%
Southeast Asia and Pacific	9	23	351	70	453	1,843	24.6%	5.1%
South Asia	2	8	204	20	234	446	52.5%	2.7%
<b>Total</b>	<b>43</b>	<b>121</b>	<b>930</b>	<b>465</b>	<b>1,559</b>	<b>8,807</b>	<b>17.7%</b>	<b>17.7%</b>

Note: “New” Renewable Energy includes solar, wind, geothermal, wave and ocean energy as well as micro-hydro power

Source: Adapted from “New Renewable Energy Resources: A Guide to the Future”, World Energy Council, 1994

This limitation in choice is caused by many factors including: a lack of information on what reliable options are available; a lack of infrastructure (insecure alternative energy supplies); a lack of institutional support (promotion, service, maintenance, etc.); and a lack of cash for first time investment in end-use devices and/or poverty. The latter not only prohibits people from buying fuel but the need to feed the family (e.g. food security at the household level) may force



people to sell fuelwood which they collect and use lower grade fuels like agro residues, dung, etc.

“Information is power” is a maxim widely known and used within the region. Without access to information, people and organizations, including businesses, will not be able to react to change in the community be it on the local, regional, national or even on a wider level. However, even though information may be available at a certain level, this does not imply that everyone has equal access to this information. Unfortunately, in some cases the fact that information is seen to confer power is taken to mean that it therefore has an economic value and it is only made available for a “fee”. This in particular hurts the “poorer” section of communities.

### **Box 3: Energy and Food Security**

Energy is an important factor to increase food-security. An increase in the use of energy in agriculture and/or the use of improved energy conversion devices can result in yield increases as well as in improved energy efficiency in the agro-and food processing sector. This helps in improving productivity and this in turn may increase income in the agricultural sector which makes it possible to increase energy inputs into agriculture. Although the investments required to make such an impact would most probably not be significantly different for biomass in comparison to conventional solutions, the approach would be considerably different. Some of the differences are:

- Energy pricing rarely reflects the energy needs of rural people
- Energy plans and agricultural programmes are rarely linked
- Energy needs for agricultural activities are rarely quantified
- Energy policies and plans generally do not focus on the agricultural and rural development sectors

In order to overcome this hurdle, efforts should be made to promote the free flow of information, e.g. sharing of information between those who have information and those who can benefit from it. The exchange of information is not limited to the end-users but includes also suppliers of energy and end-use devices as well as other sectors not directly related to energy such as forestry, agriculture, rural development, health, etc. An example of this is the case of food security as shown in box 3.

It is obvious that changes in the existing situation will not occur under a “business as usual” scenario and it is clear that inter-sectoral co-operation is of the utmost importance or in other words, there is a need for multi-sectoral approaches (energy, industry, agriculture, rural development, finance, health, etc.). This is not only true for the process of exchange of information but also with regard to sector related policies as should be clear from the example on food security as quoted in the box.

## **6.4 Support Required**

Improvements in information exchange will require concerted efforts in the form of institutional support. For the larger scale modern biomass energy sector such institutional support may already exist in the form of sector and/or business organizations, as well as the private sector mainly in the form of equipment suppliers and maintenance services. For the small scale industrial and the domestic sector institutional support may be lacking or be less effective due to

diverse needs (different sectors as well as different sizes within the sectors), potential recipients being geographically widely spread, etc.

With regard to infrastructure as well as financing, the larger scale modern applications again appear to be favoured over the traditional sector. This is not surprising as the quantities of energy used are generally much larger for modern applications, making investments in infrastructure easier to justify while the same argument is more or less valid with regard to financing arrangements (larger loan amounts resulting in less administrative overhead, more and/or better collateral, etc.).

Based on the above it is clear that, when comparing the modern and traditional sectors with regard to the need for assistance in the field of wood and biomass energy, it is the traditional energy using sector which would need support. This is not to say that the modern wood/biomass energy using sector does not need to be supported. On the contrary, when environmental impacts are considered the modern wood/biomass energy sector should be supported as much as possible.

However, the same environmental impact argument is valid and probably even more so for the traditional sector. Improved charcoal making technologies, introducing improved e.g. cleaner burning and more efficient, domestic stoves will not only help in reducing greenhouse gas emissions but will also help in improving “working conditions” for the users in terms of health, time, etc.

Considering the above, a large number of the wood energy conservation activities during the remaining RWEDP period should be directed towards the traditional sector.

## **6.5 RWEDP Wood Energy Conservation Activities in the Remaining Period**

While reviewing wood energy conservation activities undertaken from the start of the present phase of RWEDP till now (1994–1997 and shown in Appendix 6.1) it can be concluded that emphasis has been placed on “general subjects” e.g. discussing the present status and “charting” future directions<sup>1</sup>. This is in accordance with the RWEDP Project Document which placed much emphasis on more general regional activities during the first few years.

This “general approach” period has resulted in a good understanding by the staff of RWEDP (all newly recruited in 1994/1995) in terms of: 1) the status of wood energy conservation activities in the region; 2) the needs of the member countries (explicit and implicit) in this regard; and 3) the difficulties to be encountered and possible solutions to overcome the difficulties.

Even though the workshops organised in the past have been quite “general” they have resulted in a renewed interest in energy conservation activities in RWEDP member countries. In particular, the workshops which dealt with domestic energy (cooking, heating, etc.) have generated interest as judged by several requests for additional training opportunities as well pilot programmes for heating stoves. The programme on heating stoves and, to a lesser extent, the workshop on stoves for use with residues, were particularly welcomed as being innovative in the sense that these topics had not been covered in the past but did deserve attention.

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<sup>1</sup> Almost all of the workshops and expert consultation organised within the framework of Wood Energy Conservation of RWEDP can be considered as “general” workshops. Exceptions are the two workshops organised in Mataram (workshop 8 and 10 of appendix 6. 1) which can be considered as a training activity.

The workshop on stoves for residues has resulted in an increased interest in the potential of residues as a source of energy, both for small scale (mainly traditional applications) as well as large scale (mainly modern applications). In order to respond to this increased interest, RWEDP plans to make additional efforts to provide a better overview and/or database on residue production, present use and potential use, including technologies or applications which are suitable to be used with the various types of residues.

Although the “general” workshops on wood energy conservation activities have helped RWEDP staff to gain a better insight, little is known on their general impact, other than the fact that they have generated interest in participating in further training, etc. The impacts of discussions held during workshops can hardly be measured and although the conclusions reached and the recommendations made during workshops are published in the form of proceedings, the overall impact of these is difficult to gauge. However, considering the fact that in almost all cases only one or two persons ( in almost all cases from the central government sector) from each member country participated in such workshops it may be assumed that the impact (reach) is limited.

This particularly appears to be the case for workshops which dealt with “local” issues such as cookstove programmes and rural based industries which are often handled by local organizations, both governmental as well as NGO, and the private sector<sup>2</sup>.

Reflecting upon all this it is felt that during the remaining period the wood energy conservation activities should build upon the results of the previous period but at the same time should also adjust the “direction” where felt needed. This basically concerns the manner in which information is presented (workshops versus publications), more intensive “hands-on” training versus “general” approaches as well as with regard to the target group e.g. participants in workshops, etc. Besides, more efforts will be directed towards those activities which may help in addressing environmental issues, basically through conservation activities.

Some initial steps have been taken in this direction. Cookstove development and dissemination has been and will remain important in the region where a very large part of the population still depends on wood and biomass to cook their food, process their crops, etc. However, knowledge in this field in quite a few, but not all, countries is concentrated either in a few persons or in 1 or 2 institutes. While these centres of knowledge do provide training to others, such activities are often limited to technical information e.g. how to build a stove. Unfortunately, it is apparent that in many cases little follow-up is provided in terms of support to trainees in the form of refresher training, as well as how to select a stove for a particular situation (family size, gender aspects, type of fuel used, etc.). RWEDP in close co-operation with the Asian Regional Cookstove Programme (ARECOP) has decided to offer national “hands-on” training programmes in a few selected countries to address the limitations identified.

As a first step an extensive training manual has been developed which has been made available to those to be trained and other interested parties. This manual, which is to be translated into the national language, will be used during national training programmes (again in the national language) with some financial support to be provided by RWEDP. A regional

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<sup>2</sup> Efforts have been made to get more participants from the non-governmental sector including the private sector in regional workshops in order to hear also their views on the “needs” in their countries with regard to wood energy conservation activities. Such efforts were successful by entrusting not only the organisation of regional workshops to local organisations but also by letting them invite nominations to participate in such workshops. However, the final selection of nominees has remained the task of RWEDP. This is in contrast to workshops organised through local organisations but where nominations are invited by RWEDP through their focal points.

“Training of Trainers on Improved Stove Selection and Dissemination” workshop has been held in which trainees from both the governmental sector as well as NGOs have been trained. These trainees are expected to provide training (as a team) to further trainees in follow-up national workshops. Countries initially selected for this type of national training are Bangladesh, Cambodia, Nepal, Vietnam and possibly Myanmar depending on the availability of funds.

Another “new” direction is a plan to provide information in written form, initially for industrial applications. This “written material” is planned to be developed by small teams of experts from a few countries in the region by means of “expert consultations”. It is felt that in this way the “reach” of RWEDP can be increased. Instead of having 2 people from each country involved in regional workshops more people can be supplied with information on a particular subject in the form of “state of the art” manuals.

Industries to be covered include: brick and roof tile making, lime burning, tobacco curing, sugar processing on a small scale, timber drying as well as upgrading of fuels, mainly residues, through briquetting, carbonization, etc. The selection of these industries is based on the outcome of the regional expert consultation held in Penang, Malaysia (Workshop no. 3 of Appendix 6.1). A first step has been made with the publication of a manual on briquetting (RWEDP Field Document no. 46). Such manuals could, if required, be translated into national languages.

## **7. GENERAL CONCLUSIONS AND RECOMMENDATIONS**

### **7.1 Introduction**

The second Regional Advisory Committee Meeting provided opportunities for meaningful interaction between the forestry and energy sectors and a venue for substantial discussions related to wood energy issues. The Advisory Committee reiterated the member countries' need to continue and intensify efforts to develop and improve their wood energy resources. The committee members were unanimous in their view that problems of wood energy development still persist, notwithstanding the on-going national and international initiatives for improvement of wood energy production and utilization systems. The committee noted with satisfaction the catalytic role played by RWEDP and emphasized that RWEDP in its remaining period should continue to provide assistance to increase the momentum, so that the responsibilities of the project can be handed over to the member-countries after RWEDP terminates its work in 1999. It was, however recognized that some countries will still need further assistance after RWEDP terminates. It is hoped that the donor country will be willing to provide the necessary budget for this.

### **7.2 Wood Energy Data and Planning**

'Inadequate information' was recognised as one of the main constraints for wood energy development. Inadequate information means either lack of data or erroneous data. Data of bad quality have led to erroneous formulations of wood energy situations and problems, creating misconceptions. In the current phase, RWEDP has tasked itself to intensify efforts to improve the quality of data and information and to provide a better understanding of wood energy systems. RWEDP has developed a framework for a wood energy data base, reviewed and organized available secondary data, identified "best estimate" wood energy consumption data, organized more detailed wood energy supply data, initiated regional level institutional linkages and conducted several training activities. The end objective of all these 'data activities' is to assist policy makers in taking the right decisions. Despite all efforts, misconceptions still exist. It was therefore recommended that RWEDP continues its efforts to assist in information and data collection, monitoring and processing.

### **7.3 Wood Energy Conservation**

The country delegates agreed with the Wood Energy Conservation Specialist that in the field of wood energy conservation, new issues should be put on the agenda: Stoves for loose residues as fuel; modern applications of wood biomass, in general, and health aspects of stoves, in particular, are examples of these 'new issues'. These have not yet been addressed, or have been addressed inadequately both within and outside RWEDP. RWEDP in its remaining period will focus more on these issues, in addition to the continuing attention given to developing 'traditional' issues in wood energy conservation.

The country delegates stressed the importance of the continuing process of technology transfer at the national and regional levels. RWEDP was asked to address this point in the remaining project period.

## **7.4 Wood Energy Resources**

As woodfuel is mainly a by-product of larger production systems, the activities to enhance wood energy resources should be integrated into these production systems. The strategy for woodfuel production calls for the integration of trees into the farming system, as well as into all other types of tree and land based production systems. Operational concepts of incorporating woodfuels in multipurpose tree production and farming systems have been identified, developed and documented in several expert consultation meetings and disseminated during national and regional training courses.

The country delegates agreed with the Wood Energy Resources Specialist that the following problems need to be addressed in the remaining project period:

- In most areas, the major concern is not the availability or quality of woodfuel, but its skewed distribution pattern.
- Impacts of woodfuel shortages are felt more directly by rural women and children.
- Institutional responsibility for wood energy development is not clear in most countries.
- Most countries face problems related to land and tree ownership/tenure; harvesting/conversion, movement and trade of privately owned/produced wood products.
- Technical information flow and support with needed inputs to private tree growers is still weak.
- The private sector need more support in their efforts to integrate multipurpose tree species into the farming system.
- Institutes for forestry education and training seem to pay little attention to fuelwood issues. These should be integrated into forestry/agroforestry curricula.

## **7.5 Wood Energy Policies**

The participants agreed with the Chief Technical Advisor that bringing together expertise from the forestry and energy sectors, along with staff from both, is one of the most important first steps towards wood energy policy formulation. Both sectors are supposed to be involved in wood energy and can learn from each other. It is, however, observed that bringing the two sectors together is a difficult process. According to the problem analysis of the CTA a major constraint is the general lack of institutions able to develop and implement sound policies. The country delegates agreed with the CTA that institutional arrangements are a problem. RWEDP is therefore asked to assist in creating institutional structures in which all relevant sectors are represented. Not only at national level, but also at regional level.

Another problem related to wood energy policy development is the inadequate appreciation of wood energy amongst the centres of political power, notwithstanding its proven social, economic and environmental importance. The discussion group on development of policies and institutions discussed this problem in more detail (see chapter 8). Training courses, seminars and presentations during regional meetings are recommended as means to create awareness amongst policy makers.

Some general constraints on policy making analyzed by the CTA are the high turn-over of leading and middle-level government staff, administrative procedures which tend to unnecessarily delay project implementation, and sometimes unrealistic expectations with regard to UN agencies, as well as language barriers.

## **7.6 Follow-up Projects**

The country delegates expressed their gratitude for the activities and achievements of RWEDP and strongly recommended a follow up project on wood energy development. The new project should concentrate on countries facing the gravest wood energy problems.

Special emphasis was laid on the continuation of the Wood Energy News. It was stated by the country delegates that after RWEDP finishes its work in 1999, the Wood Energy News, as an important means of disseminating information should be continued to be distributed free of charge. It is hoped that the donor will support follow-up activities on wood energy development in Asia.

## **8. RECOMMENDATIONS FROM THE GROUP DISCUSSIONS**

### **8.1 Development of Policies and Institutions**

#### **8.1.1 Introduction**

The main issues which came up for discussion in this group were related to the development of wood energy policies and the institutional arrangements necessary to develop and implement these policies. The starting point of the discussions was that RWEDP cannot formulate energy or wood energy policies for the member countries. This is the exclusive responsibility of the countries themselves. The role of RWEDP is limited to advising during the process of wood energy policy development and implementation and to facilitate the establishment of inter-sectoral linkages.

#### **8.1.2 Constraints**

Several clusters of constraints to policy formulation exist. The first cluster consists of political constraints. Governments are reluctant to change policies every now and then. Usually a policy stays, unless there is a significant change in the environment and circumstances. The second problem arises after the recognition of the necessity of having a wood energy policy. The policy has to be consistent with the overall development policy and other related policies. The third cluster of constraints is related to the process of developing a rational policy. Policies are not formulated overnight. A lot of thought and discussion has to take place. To ensure that the policy is comprehensive, most countries need time to study the matter in depth and time to get feedback from all parties,.

#### **8.1.3 Policy framework: Necessary but not sufficient**

RWEDP should not be too concerned if a particular country does not have an explicit biomass/wood energy policy. What is more important is the commitment of the government in terms of implementing biomass-related activities and projects. However, it was stated that having an explicit wood energy policy is a step in the right direction.

#### **8.1.4 RWEDP's assistance**

As stated in the introduction, the member countries themselves have the main responsibility for developing wood energy policies. RWEDP is asked, therefore, to take up the following tasks:

*Provide Guidelines in Terms of Key Components of a Wood Energy Policy*

RWEDP could provide insight into the benefits expected from having a wood energy policy. For example, a cleaner environment, raising the standard of living, etc. Related to this is the assistance needed in setting feasible quantitative targets within a specific time period and assistance in identifying and designing programmes and projects to be implemented to reach the objectives. RWEDP could further provide information about policies and activities in other countries.



### *Provide Justification/Rationale for the Formulation of Wood Energy Policies*

By providing information related to the structures, effects, impacts and benefits of wood energy, RWEDP can assist in convincing policy makers of the importance of having a wood energy policy. Several justifications for having a wood energy policy are:

- a. Employment Issues: Biomass development generates 20 times more employment than conventional energy sources.
- b. Climate change issues: Sustainable use of wood energy is CO<sub>2</sub> neutral, in contrast with conventional sources of energy.
- c. Biomass as a modern fuel: Many policy makers are convinced that biomass is a traditional fuel, which will fade out, although biomass has many modern applications and a high potential to be a modern 'green' fuel.
- d. Having a wood energy policy would facilitate the process of receiving assistance by the increasing number of international agencies involved in wood energy development.
- e. The wood energy policy framework would provide signals to the private sector to undertake investments and to financial institutions to provide credit facilities needed for wood energy development.

### *Assist in Getting the Message to Top Officials*

RWEDP could assist in creating greater appreciation and concern for wood energy issues and problems by top officials from relevant sectors. One way to do this are visits by RWEDP officials to relevant top officials (e.g. personally handing over this Advisory Committee Report to the respective officials) and organizing seminars for key personnel at attractive venues.

### *Assist Policy Initiatives at the Regional and Sub-regional Level*

RWEDP could participate more actively in regional forums on (wood) energy. This will stimulate others to formulate similar policies and/or develop a common stand on biomass/wood energy policies.

### *Assist in Instituting a Feedback Mechanism*

RWEDP could assist in instituting a feedback mechanism in terms of evaluating countries' progress and providing the findings to other countries, in order to learn from each other.

## **8.2 Human Resources Development**

The discussion group on Human Resources Development recognized the need to consolidate what RWEDP has accomplished in the field of HRD to assure the momentum beyond the program's life. This can best be done by internalising HRD activities in regular programs within countries. These programs may require additional funding by donor agencies.

For the remaining project period, the following training programs were recommended:

- Policy/Planning and Databases (training on different levels).
- Resources Assessment and Development Training ( Trainers' training, for two weeks).
- Conversion Technology Training (modern and traditional applications).

### *Networking*

In general, networking within countries is weak and networking amongst countries is even weaker. However there is a great need for sharing of technology through linkages between institutions, both NGOs and GOs. RWEDP could assist in facilitating these linkages.

### *Post RWEDP*

The discussion group recognised the need to continue HRD after RWEDP is terminated. Several agencies were identified as possible 'replacements' for RWEDP, like AIT, FAO, UNDP. The training materials should be confined to the Asian region and translated into the local language.

## **8.3 Development of Databases, Information and Networking**

### *Constraints*

The discussion group on Development of Database, Information and Networking, identified several constraints related to the development of a wood energy database. There are general problems like the lack of financial resources, facilities, tools and trained manpower. But there are also specific problems related to data collection in the field of wood energy such as the large number of agencies involved (as a result of the complexity of wood energy systems), and the lack of networking amongst these agencies. Related to this chaotic structure of the wood energy sector is the problem of conflicting inputs from consultants. All these problems result in data of bad quality.

### *Assistance*

RWEDP is requested to assist in solving the problems listed above. The means to solve the problems are e.g. the introduction of standard formats, training of data collectors, use of standard units and networking amongst agencies.

### *Information*

For the remaining project period, the continuation of the publication of reports was recommended. It was further recommended that RWEDP should have a look into effective means of information dissemination, both, regional and national. The possibilities of placing wood energy information on the Internet should be reconsidered.

The group strongly recommended the continuation of the free distribution of the Wood Energy News (charging for Wood Energy News is not feasible) even after the termination of RWEDP.

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3. Mr Miguel Trossero, Senior Forestry Officer, FAO/HQrs
4. Mr Rienk Wiersma, Royal Netherlands Embassy, Bangkok
5. Ms Hanneke van Toorn, on behalf of the Dutch Government
6. Mr W. Hulscher, Chief Technical Adviser, Regional Wood Energy Development Programme in Asia (GCP/RAS/154/NET)

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## APPENDIX 1.2: RAC PROGRAMME

### Monday, 1 September

Arrival of Participants

### Tuesday, 2 September

08.30–09.00 : Registration  
09.00–10.00 : Inaugural Session,  
Welcome Address  
Inaugural Address  
Statements  
Vote of Thanks  
10.00–10.30 : Coffee Break  
10.30–12.00 : Report on RWEDP, by CTA  
12.00–13.00 : Lunch  
13.00–15.00 : Country Presentations (5 countries)  
15.00–15.30 : Coffee Break  
15.30–17.15 : Country Presentations (4 countries)  
17.30 hrs. : Welcome Cocktail

### Wednesday, 3 September

09.00–10.30 : Country Presentations (4 countries)  
10.30–11.00 : Coffee Break  
11.00–12.00 : Country Presentations (3 countries)  
12.00–13.00 : Lunch  
13.00–14.30 : Sustainable Strategies for Wood Energy Development  
a) Wood Energy Resources, report and proposals by WERS  
b) Wood Energy Conservation, report and proposals by WECS  
14.30–15.00 : Coffee Break  
15.00–17.00 : Strategies for Wood Energy Development  
c) Wood Energy Planning, report and proposals by WEPS  
d) Wood Energy Development Policies, CTA (discussion)

### Thursday 4 September

09.00–10.30 : Discussion in Groups on "Sustainable Wood Energy Development"  
1. Development of Policies and Institutions  
2. Human Resources Development  
3. Development of Databases, Information, and Networking  
10.30–11.00 : Coffee Break  
11.00–12.00 : Discussion in Groups (continued)  
12.00–13.00 : Lunch

13.00–15.00 : Reports from discussion groups and formulation of recommendations on:  
1. Priorities for Action at the Regional Level  
2. RWEDP Workplan and Follow-up Activities for the Future  
15.00–15.30 : Coffee Break  
15.30–17.00 : Closing Session  
18.00 : Dinner Reception

**Friday 5 September**

08.00 hrs : Field Trip

**Saturday, 6 September**

Departure of Participants

## APPENDIX 1.3: WELCOME ADDRESS

by

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Assistant Director General and Regional Representative of FAO for Asia and the Pacific, Dr Hadiwigeno Soetatwo,  
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Mr Rienk Wiersma,  
Senior Forestry Officer from FAO Headquarters, Mr Miguel Trossero,  
Chief Technical Adviser of RWEDP, Prof. Willem Hulscher,  
Distinguished delegates, ladies and gentlemen:

First of all, allow me to welcome the distinguished delegates from the sixteen RWEDP member countries of the FAO Regional Wood Energy Development Programme in Asia, who have come to Bangkok to participate in the 2<sup>nd</sup> Regional Advisory Committee Meeting of RWEDP.

Thailand is, indeed, pleased to express that we will always remain open to extend our hand of friendship and collaboration to the countries in the region and will always be willing to exchange knowledge and experience in the area of wood energy development.

Like most other countries which are represented here in the 2<sup>nd</sup> Regional Advisory Committee Meeting this morning, Thailand is a long-time partner of RWEDP. Indeed Thailand became an RWEDP member country in the programme's first phase which started in the mid 1980s, and we are satisfied with our participation.

The Royal Forest Department of Thailand is pleased to express that it will continue to host and participate in RWEDP initiated activities. RWEDP's activities are fully aligned to assist member countries in their efforts of institutional capacity enhancement for wood energy development. With the support of RWEDP, over the years, our knowledge and skills of wood energy related policy formulation, programme planning and implementation have been enhanced substantially. Thanks are due to RWEDP for its support in promoting sustainable management and utilization of wood energy resources in the region. A large number of regional and national training programmes, workshop sessions, expert consultations, fellowship awards, observation tours etc., have been sponsored by RWEDP during the last three years in different member countries. Thailand found those activities very much pertinent to its needs, and has benefited from its participation in them. And we shall be making full use of the opportunities provided by RWEDP in the future. I am confident that most other member countries too share a similar feeling about RWEDP's work.

I, on behalf of the Royal Forest Department of Thailand, would like to express our satisfaction and thanks to both FAO, the executing agency, and the Royal Netherlands Government, the donor country, for their continuing interest and assistance in support of wood energy development in Asia.

RWEDP has been instrumental in exploring, analysing and disseminating information about wood energy, not only to highlight its role and contribution in the national economy and rural socio-economy, but also to prove that biomass energy of different kinds will continue to play an important role in energy supply and demand and that rural households' use of woodfuel is not a

main cause of deforestation in tropical Asian countries. The differences that exist in the countries of the region, in terms of knowledge, experience and technologies, have made it fruitful for the member countries to participate in RWEDP sponsored training courses and seminars and to study RWEDP's many publications. And Thailand is willing to continue to contribute to such activities whenever other members can benefit from it.

The other positive aspect of the current phase of RWEDP's activities is the co-ordination and linkages established by RWEDP, not only between the organizations within the forestry sector, but also between the forestry and energy or power sectors in member countries. This is a very significant achievement. Now our two sectoral agencies are fully aware of the problems and potentials of area based integrated rural energy development.

I wish all distinguished participants and RWEDP a success in their efforts to finalise the programmes for the remaining two years of wood energy development in the region. I have already stated Thailand's positive feelings about our past participation and our continuing interest in participation in the coming years.

Finally, before I conclude, I would like to extend my hearty welcome to all distinguished delegates and participants to this important 2<sup>nd</sup> Regional Advisory Committee Meeting of RWEDP. I wish you all a pleasant and happy stay in Bangkok. I do hope that your present visit to Thailand will be a memorable one.

Thank you all.

## APPENDIX 1.4: INAUGURAL ADDRESS

by

*Mr Soetatwo Hadiwigeno*

*Regional Representative for Asia and the Pacific and Assistant Director-General*

Mr Sathit Sawinthara, Director-General, Royal Forest Department,  
Ms Hanneke Van Toorn, Representative of the Netherlands Government,  
Mr Rienk Wiersma, Representative of the Netherlands Embassy in Bangkok,  
Mr Miguel Trossero, Representative of FAO Headquarters,  
Mr Willem Hulscher, Chief Technical Advisor of RWEDP,  
Respected Delegates from member countries of RWEDP and sister organizations,  
Distinguished Participants,  
Ladies and gentlemen:

I am delighted to see so many delegates from FAO member-countries and other organizations. On behalf of the Regional Office for Asia and Pacific, it is my pleasure to welcome you all. This is an important meeting, because you constitute the Advisory Committee of the Regional Wood Energy Development Programme in Asia. The project links 16 countries in Asia, and as such it is one of the largest FAO field projects in terms of scope and timespan. As you are aware, this is already the third phase of the project, which altogether covers a period as long as 15 years. We very much appreciate the continuous interest and support of the Government of The Netherlands, which has funded the programme throughout. I think the joint efforts of the donor country, FAO and the member-countries are an outstanding example of successful international co-operation for development in the important sector of wood energy. I am sure the Programme will benefit a lot from the expertise represented in this meeting and from the advice which will be provided by this Committee. You will review what has been achieved so far, and you will look ahead to the coming two years and even beyond. I am confident that with all the experience gathered here, the Regional Wood Energy Development Programme will be in a good position to carry on with the same vigor as it has done so far.

As you are aware, the long-term development objective of our efforts is (I quote):

"to contribute to the sustainable production of woodfuels, their efficient processing and marketing, and their rational use for the benefit of households, industries and other enterprises".

This objective constitutes a major challenge, because when we refer to households, industries and other enterprises in the context of woodfuels, we talk about the majority of the population of about 3 billion people in this region and the numerous industries which all depend on woodfuels to meet their daily energy needs. We can safely state that wood energy is an important subsector of our economies because of its widespread use. The project has calculated that the economic value of woodfuels in the region adds up to some 30 billion US\$ per year, which indeed, illustrates the important role of woodfuels in the region. It has also been shown that in the foreseeable future wood energy consumption will not phase out but rather increase further. Such information may surprise many people who are not closely involved in this sector.

Why then is woodfuels often seen as a by-product of forests and other tree production systems rather than as a main product? In FAO terminology woodfuels are even classified as a 'non-wood' product! In fact, this terminology has historical origins and should not confuse newcomers



to the field. Perhaps, when woodfuel is not perceived as a main product of trees, it is because the use of the product is generally scattered, diverse, small-scale, rural, and often non-monetised. Fuelwood is not an export product, it is not associated with concentrated cash-flows, and to many people it has little glamour. It may also matter that woodfuel is often considered a commodity for poor people only, which is partly but not entirely correct.

Maybe because of the characteristics which I mentioned, it seems that in the wood energy sub-sector there are no, or few powerful stockholders, who take an interest in wood energy, either with government agencies or with private companies. Obviously, this situation is different from that of the main wood products like timber, or pulp and paper, or the energy sub-sectors like electricity, oil and coal. Still, as I mentioned before, numerous people in the region depend on wood energy, and their numbers will increase. Associated problems can be availability, prices and the quality of wood and other biomass fuels, as well as the affordability of proper technologies for processing and utilising the fuels. As we are aware, it is particularly the women who suffer from scarcities and poor conditions, because it is they who usually take care of the chore of meeting day-to-day household energy needs. In most countries in South-East Asia it is also the women who are involved in the numerous small-scale commercial activities mainly in the informal sector, like food stalls, tea shops, bakeries, laundries, et cetera, which all essentially depend on reliable supplies of affordable woodfuels. In the context of the current world-wide emphasis on free markets and economic liberalization, many people may benefit from this but at the same time there is the risk that many people will lose out or be further marginalised. Traditional woodfuel users in the domestic and small-scale commercial sector are likely to be amongst the losers and we should not allow that.

If my perception is right, it underlines the importance of the efforts of policy makers in the forestry and energy sectors to pay extra attention to wood energy development. It is FAO's task to assist the policy makers in member-countries in their efforts to appreciate the true social and economic value of woodfuels and to develop and implement sound policies for the benefit of the people. In fact the people gathered in this room are what I called the 'stockholders' in wood energy, because you represent the billions of anonymous users!

So far I have talked about the importance of woodfuels for the users. However, there is also the environmental aspect of wood energy supply and use. Concern about the environment has both local and global aspects. Please, allow me to make some observations on both.

Regarding local environmental concerns, it occurs to me that non-informed outsiders still look at woodfuel use as a major threat to our natural forests or even as a main cause of deforestation or forest degradation. These concepts date from the 1970's and 1980's, when it was assumed that all woodfuels originated from natural forests. Thanks to data compilations of the Regional Wood Energy Development Programme and others, we now know that these concepts are false, and that in fact the majority of woodfuels in Asia originate from non-forest land. These include farm land, plantations, homegardens, and many scattered trees. Such supplies are largely utilised on a sustainable basis, as many surveys and case studies have shown. In some localised areas, which are relatively few, woodfuel use from forest land may be on a non-sustainable basis. For such areas at risk we have to develop site-specific measures which integrate the environmental concerns with the interests of local populations. For this, the project has been able to develop several concepts and policy interventions which are area specific. Most important is that any policies and interventions are area specific. We should not allow exceptions or misconceptions to govern our general policies with regard to woodfuel supply and use. As I stated, in most areas woodfuel use is sustainable, which means that regulations should not restrict or hamper the free supply, flow and use of woodfuels. We realise that this line

of thinking has not yet been adopted by policy makers who have not familiarised themselves with the subject.

The other major environmental concern is the global environment. We know that the ever increasing use of fossil fuels like coal, oil and gas, emit large quantities of carbon dioxide and other gases into the global atmosphere. These gases are called greenhouse gases, because they may cause accelerated global warming, which is a major threat to the delicate balance of vital eco-systems. It has been well-documented that energy use per capita in Asia is still low compared to the world average, though growth rates in Asia are high. As yet, a substantial part of energy use in South and South-East Asia consists of wood and other biomass. As I mentioned before, this is largely on a sustainable basis. This implies that whatever carbon dioxide is emitted by using wood as a fuel is recaptured from the atmosphere by regrowth of trees and other vegetation. Therefore, such use of woodfuels has no net effect on greenhouse gases and global warming, which is very fortunate indeed.

Imagine, if present wood energy users in Asia ( more than 2 billion people) all switched to fossil fuels (if they could afford them), the enormous additional quantities of carbon dioxide that would be emitted into the global atmosphere! From the point of view of global warming we should be grateful that so many people rely on wood and other biomass fuels for their daily needs. It is relevant to note that most industrialised countries which have made the transition from wood energy to fossil fuels many decades ago, are now adopting policies to promote wood energy use again and are trying to reduce their consumption of fossil fuels. Such policies partly build on modern technologies which prove that wood energy need not be a traditional commodity only. I believe that in many countries in Asia too there is scope for increased application of the modern technologies for wood and other biomass fuels.

Ladies and gentlemen, I have touched upon the economic and social importance of wood energy. I have also briefly referred to its local and global environmental implications. There are other aspects of wood energy development which also matter to the FAO Regional Wood Energy Development Programme. Wood energy links to policy areas and priorities in Forestry, Energy, Poverty Alleviation, Environment, National Economy, and Women's Issues. Time does not allow me to elaborate on all these areas. I am confident that you, as the Regional Advisory Committee of the Project, will look into the many aspects and try to integrate or at least balance the many aspects. You will benefit from the contributions of delegates and experts from sister-organizations and NGOs who will join your deliberations as resource persons. I will be keen to learn about the results of your meeting which, I'm sure, will further strengthen our joint efforts in wood energy development in Asia.

Thank you.

## APPENDIX 1.5: STATEMENT BY FAO HEADQUARTERS

by

*Mr Miguel Trossero*  
*Senior Forestry Officer, Forest Department FAO/Rome*

Honourable Mr Sathit Sawintara, Director General, Royal Forest Department,  
Mr Soetatwo Hadiwigeno, Assistant Director General and Regional Representative, FAO,  
Mr Rienk Wiersma, Head, Development Co-operation Section,  
Ms Hanneke van Toorn, DGIS, Ministry of Foreign Affairs, The Netherlands,  
Dr W. Hulscher, Chief Technical Adviser, FAO/ RWEDP  
Distinguished experts and guests, friends and colleagues,  
Good morning.

Ladies and gentlemen:

It is indeed a great pleasure to have this opportunity to be with all of you during this Second Advisory Committee Meeting, which has been organised by the Regional Wood Energy Development Programme to review the activities carried out by the project so far and to identify the main areas of action for the next two years.

Mr Harcharik, Assistant Director-General, Forestry Department, has requested me to convey his regards to all of you and to send you his sincere wishes for a successful meeting.

It is opportune to mention that this meeting constitutes a really special event because we have been joined by the members of the project evaluation mission, who thus start their work by meeting the members of the Regional Advisory Committee as well as country delegates and different persons involved directly and indirectly with project activities. I would like to wish all the members of the evaluation mission success in their work. In a relatively short period of time they have to examine the wide range of multidisciplinary activities carried out by the project in the fields of forestry, energy, environment, rural development and gender issues.

Let me remind all of you that energy remains a “hot issue” in the region where the demand for fuels is growing continuously to keep pace with national development programmes. In this special energy context, the project is making a great contribution to the development and promotion of sustainable wood energy systems within and outside the region through its many widely-distributed documents and well organised activities, which are both good examples to follow and replicate.

At the same time, we are entering a “wood energy revival phase”. A greater number of policy and decision makers in public and private organizations, as well as researchers and experts, are becoming attracted to this environmentally friendly “green” source of energy in both developing and developed countries and investors are seeking for new opportunities to invest in it.

The more we do in the field of wood energy, the more we realise that a lot of crucial things still need to be done. Therefore, since wood energy is gradually becoming an attractive source of energy for the modern sectors of society, we can now also expect positive implications for the development of wood fuel utilization in the traditional sector, where fuelwood and charcoal remain the main household energy sources for cooking and heating.

Wood energy studies have been carried out recently by HQ within the framework of the regional studies of WETT (Wood Energy Today for Tomorrow) and with the close collaboration of RWEDP. These will be presented at the next meeting of the Asian Pacific Forestry Commission to be held next year. I would like to briefly summarise some aspects and issues which, from a forestry and energy point of view, are quite significant:

- The estimated volume of wood used for fuel production is several times higher than the volume of wood used for timber. This implies that wood fuel aspects and their related energy issues need greater attention by the forestry services and foresters.
- Although the contribution of wood fuels from forests still constitutes an important source of wood fuels, woodlands and trees in farming and marginal lands are also providing a great amount of wood fuels in order to meet the energy needs of both rural and urban markets.
- Wood fuels are a locally available source of energy which make a great contribution to national economies in terms of saving external currencies. The value of this wood energy contribution has been estimated by RWEDP to be approx. US\$ 30 billion/year for its 16 member countries.
- Wood fuel production and utilization is generating millions of direct and seasonal income activities in rural, forest and even urban areas. FAO has estimated that the annual utilization of 100 m<sup>3</sup> of wood fuels directly generates one job. This amount is approx. ten times higher than the employment generated with the equivalent amount of energy derived from fossil fuels.
- The total wood fuel consumption in RWEDP countries is still increasing in absolute terms, despite the massive utilization of fossil fuels to meet the increasing energy needs originating in the modern part of the economy. This issue seems to indicate that (a) the substitution of wood fuels by fossil fuels is proceeding at a relatively slow pace, when and where it happens; and (b) this wood energy replacement is counterbalanced by the additional amount of wood fuels being used by new activities and sectors as a result of population growth, new economic activities and socio-economic conditions.
- Last, but not least, although it is now clearly established that wood energy is not the main cause of deforestation, wood fuel use is far from being sustainably produced in some critical areas such as around large urban centres. Here woodfuel production is a critical issue and responsible public and private sectors need to act urgently to resolve problems related to the unsustainable use of resources.

Let me now explain that, following the other regional WETT studies, we have noted that similar wood energy situations are found in both developing and developed countries and that one of the constraints identified for the proper incorporation of wood energy into national forestry and energy programmes is the lack of information and data on production, trade, markets and utilization of wood fuels. For this reason our wood energy activities at HQ are focused on:

- the development of a harmonized terminology, not only for wood energy but also for other biomass used for energy purposes, to be used internationally for the compilation and presentation of bioenergy data;
- the improvement of our wood energy DB and statistics in order to show the relevance of wood fuels as an important forest product derived from forests, wood lands and trees; and
- the development of inter-agency collaboration for the exchange of information and data on wood energy, as well as the collection of new data to update and upgrade our wood energy DB.

We have started collaborating with important organizations and agencies, such as IEA, EUROSTAT, APERC and AIT on these three main activities and in the near future we expect to start collaborating with other agencies, such as OLADE and ENDA, to mention just a few.

Let me add that rational production and use of wood fuels is crucial for the promotion of sustainable forests management systems

I now wish to highlight some special issues and events which have occurred since the last Regional Advisory Committee Meeting took place in early 1995 and which have contributed to strengthening the much needed national and regional capabilities required for the implementation of sustainable production and efficient use of wood as a locally available and environmentally friendly source of energy. They are:

- the incorporation of the Government of Cambodia as the 16<sup>th</sup> RWEDP member country, which is a clear demonstration of the acceptability of RWEDP activities in the region;
- the huge amount of project resources, in terms of staff time and funds, which have been allocated by the project for the incorporation of wood energy into forestry and energy national policies, strategies and programmes, with a special focus on:
  1. training national counterparts in both the forestry and energy sectors;
  2. the incorporation of wood energy planning tools in member countries; and
  3. the collection, collation and distribution of wood energy information and data for the enhancement of national, regional and international wood energy data bases;
- the attention provided to gender issues and the role of women in wood energy systems; and
- the recent process of reorganization and decentralization of the FAO Field Programme, which initially caused some delays in the implementation of some project activities but which now is proving advantageous as a result of the closer co-operation between project, operational and technical FAO staff.

With the successful implementation of all these activities and a growing critical mass involved in wood energy development in member countries, the project is gaining a new momentum which will enable the successful implementation of new approaches and strategic lines of action for the next two years.

I am sure that this Advisory Committee will give serious thought to the identification of the project's strong and weak areas and will suggest the main strategic actions, mechanisms and activities to be taken to implement sustainable and environmentally friendly wood energy systems compatible with Sustainable Forest Management Systems.

Finally, I wish to express our gratitude to the Royal Thai Government for its hospitality, not only for this particular meeting but also for its continuous support in the implementation of project activities. I would also like to extend this gratitude to the Government of the Netherlands, for its total commitment to and support for the development of wood energy activities under the FAO, and to all the member countries of RWEDP for their immense contribution to the development of project activities.

## **APPENDIX 1.6: STATEMENT BY THE ROYAL DUTCH GOVERNMENT**

*by*

*Ms H. van Toorn  
DST/ML, Ministry of Foreign Affairs, The Netherlands*

Ladies and Gentlemen,

As a representative of the Netherlands Ministry of International Co-operation it is an honour to be here at the second Regional Advisory Committee Meeting. First of all, I would like to thank, on behalf of the Netherlands Government, The Thai Government for their hospitality and the whole RWEDP-team for organizing this meeting.

The starting point of the policy of the Netherlands Development Co-operation is to support sustainable development. Sustainable development meets the needs of the present generation without compromising the ability of future generations to meet their own needs. To translate sustainable development into effective policies the Netherlands Development Co-operation encourages best environmental practice while maintaining an orientation to wards a fair distribution of wealth, income and of power between the different social groups and between men and women. With respect to energy, the Netherlands are of the opinion that new energy strategies are needed. These strategies have to be based on the rational use of energy and the development of renewable energy. And, of course, these strategies have to meet the energy needs of developing countries in a manner which fosters socio-economic development and avoids environmental degradation. A transition to sustainable energy systems and services is needed.

Asian countries face an increasing need for energy services to fuel their economic and social development. Wood fuels will continue to be a major component of the energy supply of most Asian countries in the foreseeable future. The potential for biomass energy to sustainably meet the growing demand for energy in the Asian region is generally significantly underestimated. Various widespread misconceptions hamper the development of biomass energy. But biomass energy is an energy source which can certainly contribute to sustainable human and economic development and which has also no net emission of carbon into the environment as well.

The Netherlands are of the opinion that biomass has to be part of the energy development policies of the Asian countries and are also of the opinion that substantial progress has to be made in addressing and developing the instruments to efficiently produce, manage and utilise wood fuels for the benefit of households, industries and other enterprises. RWEDP is seen as an important program in achieving these two targets. Since 1985 my government has supported RWEDP and in 1994 it approved another phase of five years. The major thrust of this phase of RWEDP is to develop the capability of member countries in generating and assessing wood energy related data and using this information for the development and implementation of wood energy policies and strategies.

Probably you are all aware of the fact that this phase of RWEDP will be finished by the end of 1999. In my opinion this RAC should not only provide broad strategic advice on the direction of the programme and the contents of the work programme for its last two years, but should also discuss which steps have to be taken to make sure that the participating countries can be self-sustaining in the development and implementation of wood energy policies and strategies. This

is a challenge which has to succeed and many of you have the ability and capacity to make it happen.

Ladies and gentlemen, I wish you all a fruitful meeting which gives you the inspiration to continue the work on wood energy in your countries

Thank you.

## APPENDIX 1.7: VOTE OF THANKS

by

Dr W. S. Hulscher  
Chief Technical Adviser, FAO/RWEDP

Mr Soetatwo Hadiwigeno, Assistant Director General of FAO,  
Mr Zathit Sawinthara, Director General, Royal Forest Department,  
Ms Hanneke Van Toorn, Representative of the Netherlands Government,  
Mr Rienk Wiersma, Representative of the Netherlands Embassy in Bangkok,  
Mr Miguel Trossero, Representative of FAO Headquarters,  
Delegates from member countries of RWEDP,  
Respected guests, representatives from sister organizations, observers, and friends,

Ladies and gentlemen:

I am pleased to say a few words at the inauguration of the second meeting of the Regional Advisory Committee of the Regional Wood Energy Development Programme in Asia. First of all, I am delighted to welcome so many delegates from member-countries, who are involved in our joint programme. The number has even increased since our previous meeting early 1995, because Cambodia has joined the other 15 countries. At the end of three years of operations of our project, it is fortunate that we all can meet again to review our past activities and formulate our plans for the coming two years. A project like RWEDP could achieve very little without the continuous interest, active involvement and advice of the member countries. I am looking forward to learn from our discussions.

*Mr Sathit Sawinthara,*

Thank you for your warm words of welcome. At RWEDP we treasure the excellent co-operation with the Royal Forest Department. We have jointly engaged in many interesting activities, and quite often we at RWEDP call upon RFD experts for advice and assistance. Even our field visit at the end of the meetings of this week will be under the guidance of RFD. Thank you also for your words of welcome on behalf of our host country, which accommodates us so well.

*Mr Soetatwo Hadiwigeno,*

Thank you very much for your Inaugural Address, which underlined the importance of woodfuels, both economically and socially. I also think that your observations on the environmental implications of woodfuel use, give rise to further discussions and will stimulate us to put wood energy into a proper perspective. At RWEDP we are also grateful for your leadership of the FAO family in Bangkok and beyond, which provides us with a pleasant environment in which to work. I would also like to include Mr Dong Qinsong, DRR, in my word of thanks.



*Ms Hanneke Van Toorn,*

We very much appreciate that you have come over to Bangkok on this important occasion. We know that it would be impossible for you to attend similar occasions of the many development projects the Dutch Government is funding, and we feel honoured that you made an exception for RWEDP. I have very good memories of our interaction and co-operation for the other big project we have been preparing, in Africa. I would like to underline what the ADG has just said, about our appreciation and thanks to the Government of The Netherlands, which has generously funded the three phases of RWEDP over a period of 15 years. Also personally, I am delighted with your lively interest in our activities.

*Mr Rienk Wiersma,*

You have demonstrated your interest in matters of the regional wood energy programme on several occasions, which we very much appreciate. We have also benefited from your ideas and suggestions, which were based on a long-standing experience of development problems. I would like to thank you for your contribution, and I look forward to our further contacts.

*Mr Miguel Trossero,*

Two and a half years ago we both were in the meeting of the then Regional Committee. Since then, we have been in touch on numerous occasions, which I have very much appreciated. Since the very beginning of RWEDP, you are probably the closest friend of the project, which has benefited so much from your stimulating advice. I am happy that you could come over to Bangkok for this important meeting.

I may add a word of welcome to the members of the team for evaluation of RWEDP at the end of three years of operations, Mr Julio de Castro, Mr Jose Castilla, and Mr Napoleon Vergara. I am happy that you could arrive in Bangkok before the meetings of this week, which will allow you many interactions with country delegates and other experts assembled here. You will be most welcome to join in the discussions of the coming days.

I also welcome the expert delegates from several sister-organizations of FAO and RWEDP, and I like to thank you for joining our meeting. I am sure we will benefit from your contributions to the discussions.

Ladies and gentlemen, participants, guests, observers and other persons attending this meeting, thank you for your interest in the subject of wood energy development, and in the deliberations of our regional project.

Ladies and gentlemen, herewith the Inaugural Session is closed. Thank you.

# APPENDIX 1.8: PROFILE OF AEEMTRC

by

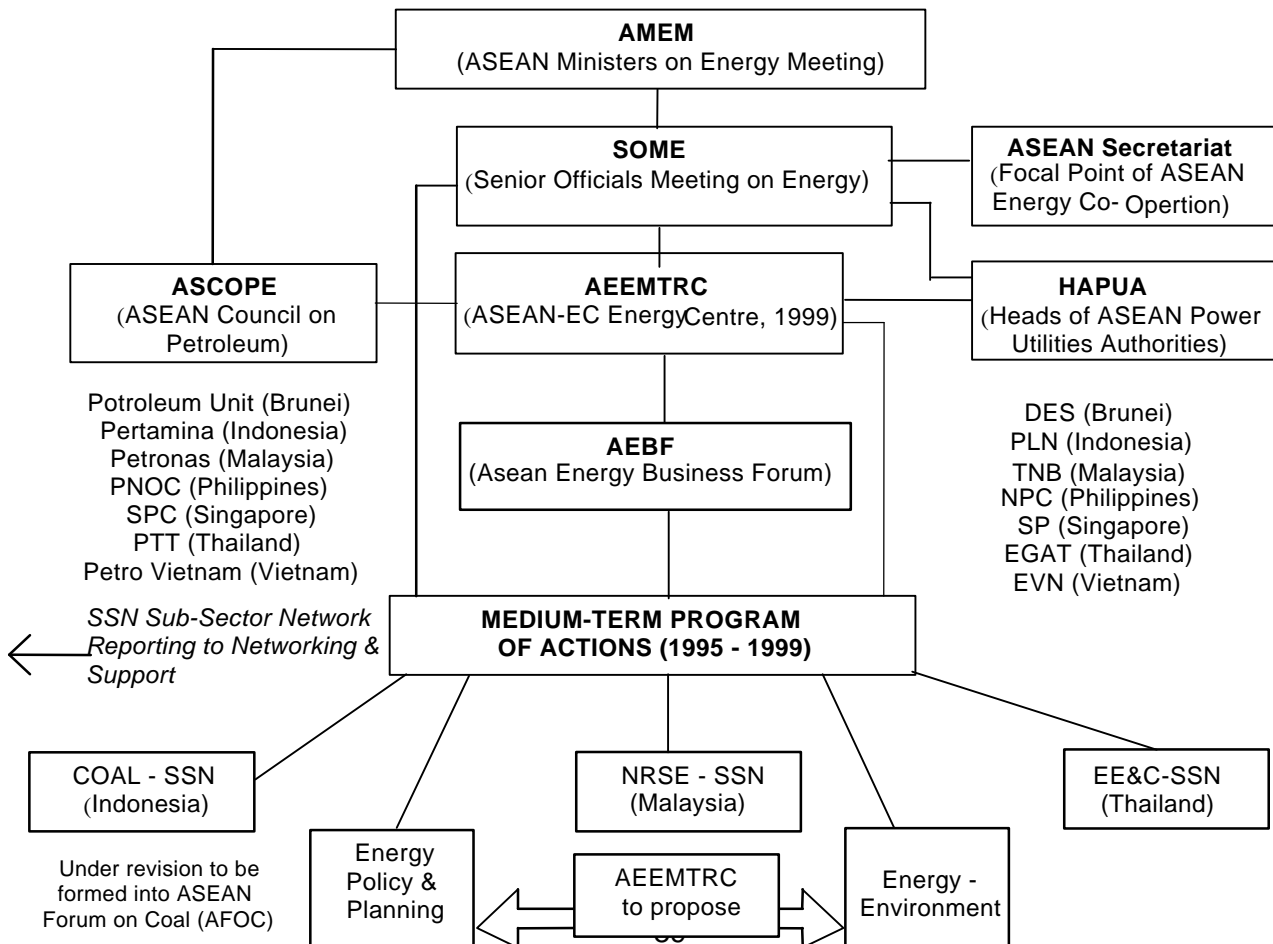
Mr H. Ibrahim  
Director, AEEMTRC

**Article 1 of The Agreement on Energy Cooperation**  
(signed in Manila, June 1986)

The range of cooperation will span planning, development, manpower training, information exchange, and encouraging private sector participation where appropriate in any of the following:

- i) Resource investigation, exploration, assessment planning & development
- ii) Energy policy and development
- iii) Technological research, development and demonstration
- iv) Implementation of energy efficiency and conservation measures
- v) Energy and environment
- vi) Energy supply planning and diversification
- vii) Process, handling, transport and distribution of various energy forms
- viii) Standardisation of energy related facilities.

## The ASEAN Energy Co-operation



### **Main Objectives**

To enhance the co-operation between ASEAN countries and to strengthen the political, economic and commercial links between the EU and ASEAN in the field of energy.

### **Specific Objectives**

- To provide a comprehensive assessment of the energy situation in ASEAN so as to develop a regional framework for national energy policies and programmes
- To formulate energy recommendations for stronger regional co-operation in energy and to identify more co-operative and mutually rewarding activities
- To manage a regional energy database
- To provide information services and training programmes on energy issues

### **The Project Steering Committee Comprises:**

- Leader of Senior Officials of Energy from ASEAN member countries
- Representative from European Commission
- Representative from ASEAN Secretariat
- Director of AEEMTRC (as Secretary)

### **ASEAN 2020**

Executes a long-term energy supply - demand study  
Provides a comprehensive assessment of the energy situation in ASEAN  
Intends to support national studies  
Identifies opportunities for regional action  
Identifies opportunities for cooperative effort between ASEAN and the EC

### **Information**

- 1 VALENTE (Energy Technology Database)
- 2 Effergy (Energy Technology Newsletter)
- 3 ASEAN Energy Projects Database
- 4 ASEAN Energy Review
- 5 Energy in ASEAN: Country Profiles
- 6 Newsletter/ASEAN Energy Bulletin
- 7 ASEAN Energy Journal
- 8 ASEAN Centre for Coal Information

### **ASEAN Energy Review**

- ASEAN Energy Database: Supply, transformation, demand, non-energy use
- Published annually
- Latest edition: 1996 (1994 data)
- Next edition: 1997 (1995 data)

### **Energy Management Training Courses**

- Energy Management Practice
- Cogeneration
- Energy Conservation Policy
- Ventilation and Air Conditioning
- Efficient Electricity Use
- Boilers and Steam Systems
- Instrumentation and Control
- Heat Exchange and Heat Recovery
- Project Evaluation and Implementation
- Energy-Environment Issues
- Energy Conservation in Transport
- Energy Management in Buildings
- Coal and Clean Coal Technology
- Energy Pricing

### **Third Party Activities**

- Master Plan in Natural Gas Development and Utilisation in ASEAN
- Asean Medium Term Programme of Action
- Coal (Indonesia)
- NRSE (Malaysia)
- Energy Efficiency and Conservation (Thailand)
- EC-ASEAN Cogen Programme
- ESA-UNET
- Coal Flow Analysis
- Promotion of Renewable Energy

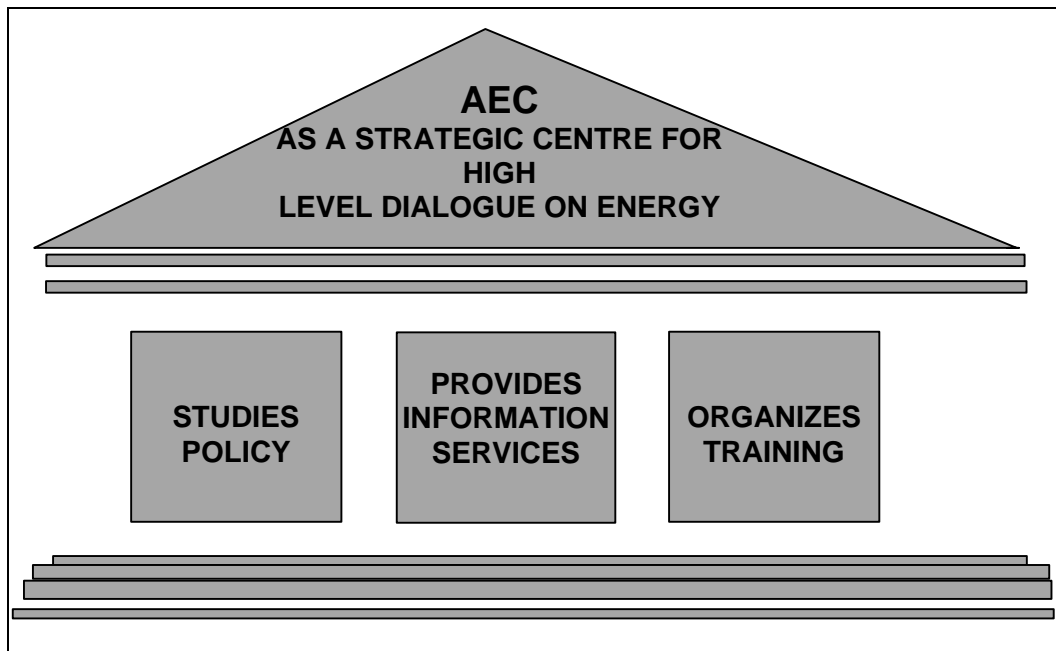
### **Transformation of AEEMTRC into ASEAN Energy Centre**

Decision of the ASEAN Energy Ministers in the  
14th AMEM in Kuala Lumpur (July 1996):

In 1999 AEEMTRC will be transformed into an ASEAN energy centre

### **The Mission of the ASEAN Energy Centre (Beginning 1999)**

To accelerate the integration of energy strategies within ASEAN to ensure that its energy development and utilisation is in harmony with the economic growth and the environmental sustainability of the regions



### Biomass in ASEAN-countries

#### *Features of Growth in ASEAN-countries:*

- Economic growth of 6.5% per year over the last ten years
- GDP of US\$ 531 bil in 1994 from US\$ 235 in 1988  
(average of 21% per year over the 6-year period)
- Population Growth reaching 342 mil in 1994 from 309 mil in 1988  
(average of 1.8% per year over the 6-year period)
- Total energy final demand (exc. non-commercial energy) of 120 Mtoe in 1994 compared to 68 Mtoe in 1988 (almost doubling in 6 years)
- Electricity Growth varying from of 4 - 17 % per year (4% for Philippines and 17% for Indonesia)

#### *Why is NRSE (inc. Biomass) Important to ASEAN-countries?*

- ASEAN potential energy supply will not be sufficient to meet its future energy demand in the long term
- At the current rate of growth ASEAN's energy demand will be four times that of current need in the year 2020
- Reducing dependency on oil has been a policy of high priority in ASEAN (since 1992, when ASEAN became a net importer of oil)
- NRSE (including biomass) is part of the ASEAN Member Countries' strategies to resolve their energy security and environmental concerns.

### *Biomass in Indonesia*

Biomass supply is estimated at 247 million cubic metres (40% of the total energy mix)

Commercial potentials include (Work Bank Study, 1992):

- Medium-sized (1 - 5 MW) dedicated power plant fueled with palm oil residues or plywood mill residues in regions where medium-scaled diesel power generation is used
- Low-efficiency (low-investment) electricity cogeneration with surplus electricity delivery to the grid by palm oil mills in regions with large PLN operated systems
- High-efficiency (high-investment) electricity auto-generation at plywood mills and palm oil mills in regions where medium-scale diesel power-plants (1-5 MW) are used
- High-efficiency electricity production with power export to the grid for newly planned sugar and palm oil mills
- Rubber-wood gasification for electricity self-sufficiency and surplus electricity delivery at sawmills

### *Biomass in Malaysia*

- Biomass energy estimated to contribute 12% of total energy consumption
- Wood residue production estimated at 10 mil m<sup>3</sup> per year
- Agro-wastes such as palm oil, rubber, sawlogs, cocoa, paddy, and timber estimated at 75 mil m<sup>3</sup>
- Electricity self-generation from biomass (replacing diesel) estimated at:
  - 198 GWH in West Malaysia
  - 290 GWH in Sabah
  - 7 GWH in Sarawak

### *Biomass in the Philippines*

- Produced 2 Mtoe or 9% of total energy consumption in 1995
- Total biomass supply for 1996 estimated at 16 Mtoe, and a modest growth by 19 Mtoe
- Bagasse being widely used in sugar-cane estates, agri wastes (rice husks, coconut husks & wood wastes) in industries and animal wastes for biogas production
- A World Bank Study indicates 60-90 MW potential from bagasse, 40 MW from rice hulls and 20 MW from coconut wastes

### **ASEAN-EC Cogen Programme**

- Sister organisation of AEEMTRC to accelerate implementation of proven technologies generating heat and power from wood and agro-industrial wastes
- Implementation of full-scale demonstration projects (FSDP) to demonstrate technical reliability and economic viability
- EU's grant covers 15% of the total tax-free equipment costs, with a ceiling of ECUs 400,000 per project
- Several projects have already been selected, 6 of which have been commissioned bringing in over US\$ 100 million worth of European or Euro-ASEAN equipment and technology into ASEAN

### **AEEMTRC'S Work and Involvement in Biomass**

- Providing continuous awareness in the utilisation of biomass as one of ASEAN's potential strategies to contribute to a sustainable energy supply
- Analysis of the Energy Potential from Incineration of Municipal Solid Waste (MSW) in Cities
- Partner in the project "Promotion of Renewable Energy Sources in South-East Asia (PRESSEA)", which is to establish an information network for European renewable energy systems and technologies for rural electrification in five selected countries in S-E Asia (Indonesia, Malaysia, Philippines, Thailand and Vietnam). A pilot market study in the biomass sector will be conducted in two countries (Philippines and Thailand)



## APPENDIX 1.9: GUIDELINES FOR COUNTRY PRESENTATIONS

The second meeting of RWEDP's Regional Advisory Committee is scheduled to take place at the end of three year of operations of the present phase of RWEDP. The meeting will provide an excellent opportunity to discuss the experiences of the past three years and look ahead at the coming two years, and beyond. The general objective of the meeting is to contribute to the development and implementation of improved wood energy policies, plans and strategies in member countries.

The immediate objectives of the meeting are threefold:

- a. to review current policies and programmes for wood energy development in RWEDP member-countries;
- b. to provide strategic advice on priorities for RWEDP's workplans and implementation at the regional level; and
- c. to discuss priorities and options for wood energy development programmes after termination of RWEDP.

Country presentations are invited as an important contribution to the meeting. Each country presentation should be an integrated one from both the forestry and the energy sector (i.e. integrated from both focal points in the member country). Later in the agenda of the meeting, time will be available for general advice and discussions on RWEDP, as one of the important features of the regional project is the interaction amongst its members.

There are 16 member countries of RWEDP. One day of the Regional Meeting is reserved for the country presentations. This implies that 20 minutes on the average will be available per country for an oral presentation, including immediate reactions from the audience. It is suggested to aim at an oral presentation of not more than 15 minutes, leaving a few minutes for immediate reactions. We will have to adhere strictly to the time schedule. The short time period probably allows for a summary of the country paper only. A copy of the full paper can be distributed and published in the proceedings of the meeting. Timely distribution is facilitated if the RWEDP office receives a copy in advance.

Some suggestions are given below for the oral summaries of the country papers, for optimal benefit of the meeting.

*Address the following points:*

1. National policies for wood energy

Identify recent developments in:

- main policies and legislation regarding wood energy production and use;
- current arrangements and institutional strengths and weaknesses in the country regarding wood energy production and use;
- the position of wood energy in energy planning of the country;
- priorities of the Focal Points and/or National Advisory Committee for RWEDP; and
- activities of National Wood Energy Working Groups.

## 2. Experiences so far and problems encountered

Identify:

- advances that have been made in wood energy development and how these have been made;
- the current main wood energy problems in the country;
- the major constraints on wood energy resource development, conservation and planning in the country; and
- other constraints which are relevant.

## 3. Advice to RWEDP

Suggest:

- priorities for further RWEDP assistance and co-operation;
- observations on training in wood energy which are relevant for further activities;
- ways of further strengthening wood energy data collection and analysis;
- priorities for follow-up after termination of RWEDP.

## APPENDIX 2.1: GROUP ACTIVITIES COMPLETED AND REMAINING

**Table 4: Group Activities (Workshops, Courses, Expert Consultations, Study Tours) Completed At End August 1997**

Regional				National*				Study Tours			
activity	nr	compl	remain	activity	nr	compl	remain	activity	nr	compl	remain
143	5x	3	2	121	1	1		145	1x	1	-
212	1x	0	1	144	10x	3	7				
244	2x	1	1	245	10x	1	9	213	1x	0	1
246	2x	2	-					247	1x	0	1
242	2x	2	-								
312	2x	2	-	313	10x	7	3				
323	1x	1	-	324	10x	2	8				
333	5x	4	1	334	5x	1	4				
342	1x	1	-								
352	1x	1	1								
356	5x	0	5	357	6x	3	3				
364	1x	1	-								
<b>Total</b>	<b>28</b>	<b>18</b>	<b>10</b>	<b>Total</b>	<b>52</b>	<b>18</b>	<b>34</b>	<b>Total</b>	<b>3</b>	<b>1</b>	<b>2</b>

\*national completed at end August 1997

144: Philippines, Sri Lanka

245: Philippines

313: China, Vietnam, Thailand, Sri Lanka, Bangladesh

324: Pakistan, India, Myanmar

334: Indonesia

357: Pakistan, Bangladesh, Cambodia

**Table 5: RWEDP Activities Statistics**

Statistics	At End '96		At End Aug. '97		Expected At End '97	
Total due	83 acts	60 months	83 acts.	60 months	83 acts	60 months
Completed	32 acts	27 months	37 acts.	27 months	53 acts	39 months
% completed	39%	45%	38%	58%	64%	65%

**Table 6: Number of Participants Trained Per Country  
(Updated Till November 1997)**

Country	Number of participants
Bangladesh	90
Bhutan	18
Cambodia	64
China	73
India	79
Indonesia	65
Lao	65
Malaysia	37
Maldives	15
Myanmar	143
Nepal	51
Pakistan	142
Philippines	144
Sri Lanka	94
Thailand	88
Vietnam	89
Others	3
<b>Total</b>	<b>1260</b>

## APPENDIX 2.2: GREENHOUSE GAS IMPLICATIONS OF WOODFUEL USE

Greenhouse gas implications provide a strong economic justification for wood energy development projects in Asia, which is explained in the RWEDP publication 'Regional Study on Wood Energy Today and Tomorrow in Asia'.

### CO<sub>2</sub> Emissions

Implications of woodfuel use for the global environment can be evaluated by estimating the associated greenhouse gas emissions. Only CO<sub>2</sub> (carbon dioxide), the main greenhouse gas, will be considered here, leaving aside gases like methane and other carbon-hydrogens. Any emissions caused by woodfuels can be compared with emissions from alternative fuels.

Though combusting wood, of course, emits CO<sub>2</sub> into the atmosphere, regrowth of wood captures CO<sub>2</sub> from the atmosphere. As a first approximation it can be stated that woodfuel use is carbon neutral, i.e. there is no net emission of carbon into the environment. The approximation is supported by the evidence of two dominant mechanisms. First, it is observed that by far the largest part of woodfuel use takes place on a sustainable basis. This applies to virtually all woodfuels originating from non-forest land (e.g. agriculture land, plantations and homegardens), and to most of the woodfuels from forest land. Sustainability implies carbon neutrality, because the same amount of CO<sub>2</sub> emitted by wood combustion, is recaptured from the atmosphere by regrowth of wood. Second, with regard to woodfuels acquired as left-overs from non-sustainable logging and land conversion, it is noted that not using the left-overs for fuel (or for other purposes) would imply that they will decompose by natural processes. Eventually, natural decomposition leads to the same amount of carbon emitted into the atmosphere as when the woody material is combusted (though not necessarily distributed amongst CO<sub>2</sub>, methane and other greenhouse gases in the same way).

Obviously, if woodfuels were not utilized, some alternative energy source would be used. For most applications and in most countries, the hypothetical alternative would be a fossil fuel, i.e. coal, gas, or oil products. For a few applications and in a few countries, hydro and wind power could be the hypothetical alternative, whereas within the next 15 years or so the option of other renewables like solar photo-voltaics is negligible in terms of energy quantity. The effects of fossil fuel use on the global atmosphere have been well documented. Typical data for the emission of CO<sub>2</sub> per fuel and per unit of energy are available from e.g. the LEAP Environmental Data Base (SEI, Boston). Furthermore, the other renewable energy sources are considered to be carbon neutral, like wood.

The implications of woodfuel use in Asia for the global environment can then be evaluated by estimating how much CO<sub>2</sub> emission from hypothetical alternatives is avoided by woodfuel use. The most likely (or least unlikely) mix of alternative energy sources varies per country. For the purpose of the present study, LPG can be considered as the alternative. This leads to a simplistic though conservative estimate, because per unit of energy coal emits about 33% more and kerosene 7% more CO<sub>2</sub> than LPG. The results are represented in RWEDP's study 'Regional Study on Wood Energy Today and Tomorrow in Asia' (1997). Switching between wood and other biomass fuels like agri-residues is ignored, because carbon neutrality applies to the other biomass fuels for the same reasons as for wood.

From table 7 it is seen that in 1994 woodfuel use aggregated for RWEDP member-countries results in avoided emission of about 277,683 kton CO<sub>2</sub> per annum as compared to hypothetical

LPG use. This equals 6% of the current CO<sub>2</sub> emission due to total fuel use in the same countries. By the year 2010 the figures would be 349,615 kton and 3% respectively.

The economic benefit of current woodfuel use in Asia for the global environment can be appreciated by estimating the cost which would otherwise be required for avoiding or recapturing the emitted CO<sub>2</sub> from the atmosphere. Cost estimates for the latter vary a lot, depending on conditions and technological options (like removal, storage, recapturing, avoiding, etc., of the CO<sub>2</sub>). Based on IPCC estimates (IPCC Technical Paper 1, 1997) 50 US\$ per ton avoided/recaptured CO<sub>2</sub> is a typical figure within the present range of options. Hence, it can be estimated that in 1994 and in 2010 about 14 billion US\$ and about 17 billion US\$, respectively for CO<sub>2</sub>-related costs are avoided by woodfuel use in RWEDP member-countries.

### **Example: Benefits of Wood Energy Development**

The above estimates would allow for an evaluation of the benefits of a wood energy development programme like RWEDP for the global environment. RWEDP incorporates, amongst others, various activities in wood energy conservation, e.g. for adoption of improved stoves, either with or without improved end-use efficiency. This is being achieved in co-operation with government institutions, NGOs and donor agencies. When conservation is achieved, the ever increasing energy demand in the region can partly be met by available woodfuels, rather than fully resorting to additional fossil fuel with their associated CO<sub>2</sub> emissions. However, as firm data on achievements in wood energy conservation are not (yet) available, some assumptions have to be made.

The break-even point of a programme like RWEDP in terms of costs versus benefits for the global environment can then be estimated as follows. On the cost side, the Dutch Government through FAO has allocated to RWEDP a total of 15.2 million US\$ over the period 1984–1999. On the benefit side, the same figure as above (50 US\$/ton) for recapturing/avoiding CO<sub>2</sub> from the atmosphere can be applied. 'Environmental break-even' can thus be calculated for RWEDP in terms of avoided CO<sub>2</sub>. This leads to the following results:

- If break-even is to be reached within, say, 10 years, a modest annual contribution from RWEDP of only 0.01% to wood energy conservation in the region would suffice. In fact, claiming such a limited impact seems to be very modest, maybe even unrealistically small.
- If alternatively, the contribution of RWEDP to wood energy conservation in the region is assumed to be, say, 0.1% (which still seems to be modest<sup>3</sup>), the pay-back period of RWEDP would be only 11 months.

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<sup>3</sup> It is not easy to quantify the overall impact of a programme like RWEDP in terms of wood energy saving. How many improved household stoves are being adopted? Which part of that, if any, could be accredited to RWEDP? How much woodfuel is saved by each improved stove? (China claims to have introduced 150 million improved stoves, and India some 25 million) And what about the many industrial and commercial users? Equally difficult is to quantify the impact of improved wood energy in terms of avoiding fossil fuel use. How many people decide to skip the option of a kerosene, coal or LPG stove, partly because their traditional wood stove has become more convenient, more efficient and less smoky or partly because woodfuel supply (still) happens to be available? Again, which part of that could be accredited to RWEDP? Even more difficult, perhaps impossible, would be to try and estimate RWEDP's impact on the fuelwood resource bases. How could one ever observe if a multiple purpose tree production system would be, say, 0.1% more productive in terms of fuelwood supply? Or that such resource base can statistically serve 0.1% more end-use applications? If such data were known, the easy part would be converting them into CO<sub>2</sub> savings.

It should be noted that RWEDP has several objectives other than contributing to reducing greenhouse gas emissions. In fact, RWEDP's activities aim to support 6 sectoral priorities, of which only one is the environment, both locally and globally.

For comparison it is noted that the Government of The Netherlands has allocated the equivalent of 375 million US\$ in its national budget for 1997 in order to achieve reduction of 15,290 kton CO<sub>2</sub> emissions into the global atmosphere in 5 years time, i.e. 3,058 kton per annum. This implies that the budget allows for a cost of 123 US\$/ton CO<sub>2</sub>. [reference: Main Issues of Explanatory Notes of LNV-Budget 1997 (in Dutch: Hoofdlijnen Memorie van Toelichting op LNV-Begroting 1997)] The programme will be implemented jointly by three Ministries (Economic Affairs, Environment, and Agriculture). It is quite likely that the same effect in terms of avoiding global CO<sub>2</sub> emission can be achieved by the Minister for Development Co-operation and FAO via a dedicated wood energy conservation programme in Asia with a limited budget.

## Global Environmental Policy

From the perspective of global environmental policy the following remarks should be made. Many general policies regarding wood energy and the environment are still based on the exceptional cases, i.e. the relatively few areas where woodfuel use is not sustainable. This even leads to donor policies for promotion of fuel transition, i.e. away from woodfuel towards fossil fuels or towards expensive forms of renewable energy. However, from available evidence it must be concluded that by far the larger part of woodfuel use takes place on a sustainable basis. Therefore it is in fact beneficial that people stick to the practice of woodfuel use for their daily needs. In terms of quantity of avoided CO<sub>2</sub> emission, the very fact of using wood energy by the majority of people is even more important than adoption of efficient wood stoves by a limited number of users. This observation may redirect priorities within wood energy conservation programmes. Rather than targeting at maximum efficiency of stoves with associated price increase of appliances, priorities should be for convenience, health and overall attractiveness at affordable prices, so as to reach the maximum number of wood energy users. For areas where, indeed, woodfuel practices are not sustainable, tailor-made programmes should be designed.

As far as carbon sequestration through reforestation, afforestation and/or forest rehabilitation is an objective of present global environmental policies, it is obvious that such forest-related activities will be economically more feasible when the new or upgraded forest resource base will be available for sustainable use of wood and non-wood products. Sustainable woodfuel use qualifies as one of the prime applications in this context.

The above policy considerations are not only relevant for international agencies, but also for forest policy makers in Asia and the Pacific for an outlook to the year 2010. Further programmes and projects targeting on wood energy development could be prepared and justified with a view to substantial global environmental benefits, not only for present RWEDP member-countries, but also for other countries in the Asia-Pacific region.

## SUMMARY FOR 16 RWEDP MEMBER-COUNTRIES

*Table 7 Greenhouse gas implications of woodfuel use*

<b>Environmental effect</b>	1994	2010
Total CO <sub>2</sub> emission from fossil fuels	4,317 Mton	10,602 Mton
Avoided CO <sub>2</sub> emission by fuelwood use (as compared to LPG)	278 Mton	350 Mton
Avoided CO <sub>2</sub> clean-up costs (million US\$)	14,000	17,500
<b>Environmental break-even</b>		
If in 10 years, RWEDP should result in:	0.01% /a w.e. conservation	
Or, if 0.1% /a wood energy. is conserved via RWEDP:	pay back in 11 months	

RWEDP's activities aim to strengthen national and local ongoing efforts in wood energy development through conservation and sustainable management and utilization of wood energy resources. For the purpose of the present study it may be acceptable to set a benchmark for RWEDP's contribution to wood energy conservation and resource development in the region. The benchmark could be put at, say, a modest 0.1% of current wood energy use. Translated into the household sector, this would imply that because of RWEDP's impact, one in 1,000 households in Asia would stick to an (improved) woodstove rather than switching to fossil fuel. In terms of numbers, the stated benchmark seems modest considering that (a) some 3,000 staff



from various government and non-government organizations will have been trained in RWEDP's programme, and each trained staff can be expected to account for a certain multiplication factor during a number of years; (b) some 70,000 copies of wood energy related publications will have been distributed by RWEDP to institutional subscribers in Asia, and (c) already some 150 million improved wood stoves have been disseminated in RWEDP member-countries.

## APPENDIX 3.1: EXAMPLE OF TERMS OF REFERENCE FOR INTERNSHIPS

Terms of reference for internships on Development of Training Materials for the National Seminar on Data Collection, Assessment and Analysis for Wood Energy Planning – Philippines

### **Background:**

Part of RWEDP's programme is to implement a national training seminar on "Data Collection Assessment and Analysis" in its member countries (Act. 1.4.4). RWEDP, with the co-operation of the Department of Energy, and in co-operation with the Department of Environment and Natural Resources, plans to organise one such seminar for the Philippines. In this connection, RWEDP will invite two national experts from each of the two agencies mentioned to come to RWEDP's office in Bangkok and work under the supervision of the wood energy planning specialist in developing training materials for this national seminar.

### **Task of Interns:**

The two national experts (interns) will have the following specific tasks:

#### *Part A (Before the Interns are in Bangkok):*

- Provide a background document that describes the current planning practices of relevant sectors, i.e., energy, forestry and agriculture, and identifies gaps and weaknesses that lead to the exclusion of wood energy.

#### *Part B (Tasks while in RWEDP Office in Bangkok):*

- Formulate the rationale, objectives and programme of activities of the national seminar (see attached draft programme).
- Develop the desired participants' profile and identify agencies and institutions which should send participants to the seminar.
- Enumerate the specific topics to be taken up in the seminar, and prepare a detailed schedule for the presentation and/or discussion of the said topics. Identify other activities which should be included in the seminar such as exercises, workshops and field visits.
- Identify and collect reference materials for the topics to be taken up in the seminar and formulate detailed outline of the presentation materials and guidelines for discussions, exercises and workshops for the said topic.
- Prepare TORs for the preparation of presentation materials and guidelines for the topics identified and identify local resource persons for the said topics.
- Identify additional support needed from RWEDP for the preparation of the presentation materials and guidelines. Map-out the logistical and administrative support activities required in the conduct of the seminar.

#### *Part C: (Tasks upon Returning to Country):*

- Co-ordinate with identified resource persons for the preparation of the presentation materials and/or guidelines.
- Review, edit and compile the materials into a training guidebook for the national seminar.

## **RWEDP Contribution:**

RWEDP will fund the round trip travel and living allowance (US\$ /day for up to 15 days) of national experts from each of the two agencies.

## **Appendix: Draft Programme for National Seminar on Data Collection, Assessment and Analysis for Wood Energy Planning**

- I. Morning, Monday, Day 1
  - A. Wood Energy Systems
  - B. Energy Basics
  - C. Typology of Wood Energy Systems
  - D. National Wood Energy Situation
  
- II. Afternoon, Monday, Day 1 to Morning, Friday, Day 5
  - A. Wood Energy in Area-Based Planning
  - B. Rationale and Concepts of Area-Based Energy Planning
  - C. Wood Energy in the Following Elements of Area-Based Energy Planning
    1. Energy demand analysis
    2. Energy supply analysis
    3. Energy supply-demand balancing
    4. Energy-economic evaluation
    5. Energy-environmental evaluation(Includes hands-on training in the use of LEAP)
  
- III. Afternoon, Friday, Day 5 to Morning, Monday, Day 7  
(With homework over the weekend)
  - A. Wood Energy Project Identification, Development and Evaluation
  - B. Wood Resource Development (Natural forest management, agroforestry, block plantations)
  - C. Improved Stoves Dissemination Projects
  - D. Efficiency Improvement in Wood-fuel Using Enterprises
  
- IV. Afternoon, Monday, Day 7 to Morning, Wednesday, Day 9
  - A. Wood Energy in Energy Analysis for Macro-Level Planning Integration of Area-Based Plans into a National Plan
    1. Policy interventions
    2. Pricing
    3. Other market interventions
    4. Energy-economy evaluation
    5. Energy-environment evaluation(Includes hands-on training in the use of LEAP)
  
- V. Afternoon, Wednesday, Day 9 to Morning, Saturday, Day 12  
(Includes fieldwork on Day 10 )
  - A. Wood Energy Data Collection and Organization
    1. Data collection for demand studies (desk surveys, structured surveys, RRA, energy audits) related to households, industries/enterprises, informal sectors

2. Data collection for supply studies (desk surveys, RRA, remote sensing)
  - a) wood resource assessment
  - b) fuel flow studies
3. Wood energy data base
4. Integrating wood energy data into national energy data bases and other sectoral data bases (i.e., forestry, agriculture)

## **APPENDIX 3.2: EXAMPLE OF TERMS OF REFERENCE FOR A NATIONAL TRAINING WORKSHOP**

Terms of reference for training workshop on Rural Energy Planning and Development with Special Emphasis on Wood Energy Planning 9<sup>th</sup> -13<sup>th</sup> Dec. 1996, Sri Lanka

### **Energy System of the Country**

Sri Lanka is dependent on imported fossil fuel for most of the commercial energy supply. It is also endowed with substantial biomass resources which can meet most of the traditional energy demand. Sri Lanka also has a considerable hydro potential of which the most economical potential has been harnessed.

The main sources of energy in Sri Lanka are biomass, petroleum and hydro power. Coal and LPG are imported in very small quantities. Non-conventional sources of energy such as solar pv for rural domestic lighting, wind power for lift irrigation, producer gas for very specific narrow applications, biogas as a domestic cooking fuel etc. have been promoted vigorously, but do not account for even 1% of the gross supply of energy to the country.

The Ministry of Irrigation, Power and Energy is an umbrella Ministry which is responsible for the supply of mainly commercial energy sources. The promotion of non-conventional energy has been pursued by a multitude of agencies but is the responsibility of the Ministry of Irrigation, Power and Energy which has its own policy making and implementation arm. The respective line agencies such as CEB, CPC undertake their own sectoral planning strictly according to economic and demand trends of the market.

The traditional energy sources are located in the non formal energy sector. In the case of the industrial use of firewood, however, it is supplied through the State Timber Corporation under the Ministry of Lands and Land Development. Other major industries have been advised to have their own wood lots to provide their fuelwood requirement. The tea industry which is the highest consumer of firewood has made considerable progress in having its own wood lots to supply its demand. Agro residues are not transported in large quantities but marketed through a very informal marketing mechanism. These sources have become a good substitute for firewood and hence are beginning to gain a commercial value.

Fuelwood, the most common traditional fuel, will continue to play the dominant role in the national energy picture. The expected demand growth for fuelwood is about 1% per annum, just under the expected population growth rate. The reduced growth rate is a result of the greater efficiency of use and substitution with LP gas in the households. Meanwhile, the share of petroleum products and electricity is sharply increasing. Petroleum product demands are expected to grow at between 2%–5% per annum and electricity is expected to grow at about 8%–10% per annum.

Significant increase in the number of rural households using electricity has been recorded, while 2/3 of the urban households too are now connected to the mains. However, a significant portion of the households (73%) continued to use kerosene for lighting in 1986/7. The current (1995) estimate is about 602.

A significant shift in the use of energy for cooking is also taking place in the urban sector, in which over 20% of the households use LPG for cooking (current estimate 25%). The corresponding trend in the rural households is not so significant, but LPG is becoming popular in all parts of the country. Demand growth rates for LPG have been in excess of 20% per annum.

The use of electricity for cooking is nearly non-existent with the relatively high cost of electricity for consumers in the higher monthly consumption brackets. This status is likely to remain while the cross-subsidy from upper bracket electricity consumers to the lower income consumers of electricity remains. Further, even if prices are equalised, electricity is unlikely to favourably compete with LPG as a cooking fuel.

## **Background and Justification**

The pattern of rural energy supply and consumption varies within a rural area as well as between rural regions. The options available for energy substitution, supply improvement and efficiency improvement for household and industrial use can therefore be assessed only through de-centralised, macro-level area based integrated planning. Such macro-level planning can account for specific social-cultural economic variables and their relationships to the existing and desired pattern of energy supply, conversion and consumption. The macro level energy plans could be integrated with other macro level, provincial and national energy and development plans to ensure their validity and successful implementation.

Rural energy development through appropriate policy and planning programmes at both national and local levels require more reliable, accurate and up-to-date data on energy supply and demand. Over the years there have been many attempts to develop a comprehensive energy data base but the results produced by these fragmented initiatives seem to have only limited use. Lack of a sound data base on energy use and supply is a major gap in developing rural energy policy and planning programmes.

Useful research and development work on wood gasification, biogas and other renewable energy systems have been conducted over several years in the past mainly by the Government Research Institutions. However, there is a need for more research on appropriate and efficient wood energy conversion and utilization technologies.

It is essential that a co-ordinating mechanism be established to examine the R and D inputs required to implement the regional energy plans, provide facilities to research institutions and avoid duplication of effort.

Training requirement at the national level require the simultaneous development of an institutional set-up for rural energy planning and project implementation. There is a need to establish provincial level rural energy planning units to co-ordinate project implementation and to feed the national level planners and analysts data about the rural energy situations and programmes.

Also there is a lack of community involvement in planning and implementation of rural energy projects. The needs of the people are often identified by the officials and technologies are imposed on the people without much concern for their background or their aspirations and perspectives.

There is a lack of awareness among the people on the potential and availability of technologies and the energy system. Therefore a certain amount of sensitization and guidance is required to help people to reach decisions and solutions appropriate to their conditions.

Under these circumstances. It is proposed to establish rural energy planning cells under the energy ministries of Provincial Councils to undertake rural energy planning / development at provincial level.

## **Objective of the Workshop**

The overall objective of the National Workshop is to identify policies and actions to improve the socio economic development of rural communities through planned energy inputs.

The secondary objectives are:

- a. to develop an institutional framework for rural energy planning and development;
- b. to identify mechanisms for regular collection and analysis of energy data on a continuous basis;
- c. to identify appropriate technical fields for implementation; and
- d. to identify possibilities and limitations of area based rural energy planning.

## **Workshop Schedule and Profile of Participants**

The workshop will be conducted in two parts, with six-month case studies implemented between the first and the second part. The first part is composed of the following sessions:

- a. Introductory Session -- 1/2 day -- 9 December, 1996. Topic: Seminar on the energy situation and the energy planning process in Sri Lanka. Participants: Senior policy makers and politicians of government and provincial councils, provincial development/planning officers, planning officers of various economic sectors of the government.
- b. Technical Sessions -- 4 1/2 days -- 9 to 13 December, 1996. Topics: Energy data collection and analysis, energy modelling and planning, rural energy technologies, rural energy project identification and evaluation, and introduction to case studies. Participants: Provincial development/planning officers, planning officers of various economic sectors of the government.

The second part is composed of:

Final Sessions -- 2 days -- July, 1997. Topics: Review and assessment of case studies.

Participants: Provincial development/planning officers and planning officers of various economic sectors of the government.

As stated earlier, there will be case studies on decentralised energy planning with special emphasis on wood energy to be conducted for six months which will be conducted by provincial development/planning officers at provincial level. The conduct of the case studies is not included in this TOR.

## **Tasks of the Energy Conservation Fund, Ministry of Irrigation, Power and Energy**

The workshop will be convened by the Energy Conservation Fund of the Ministry of Irrigation , Power and Energy. The following are their corresponding tasks:

- a. Identify and invite resource persons and guests to the training-workshop. Identify and invite key local participants in the training-workshop from the government, NGO, and private sectors.
- b. Prepare the information and training materials needed in the training-workshop.
- c. At the end of the training-workshop, prepare a final report to be submitted to RWEDP (see attachment for format of report).
- d. Provide secretarial support to the training-workshop.
- e. Arrange and pay for the cost of venue of the training-workshop.

- f. Provide other logistical and administrative support needed in the conduct of the training-workshop.

**Contribution of RWEDP**

RWEDP will provide the equivalent of US\$10,000.00 to ECF-MIPE as its financial contribution to the conduct of this national training-workshop. Disbursement will be divided into two instalments according to the following schedule:

Upon submission of letter of acceptance of this TOR.....	US\$8,000.00
Upon submission of three copies of draft summary of report .....	2,000.00
TOTAL.....	US\$10,00.00

**Appendix: Contents Of Report On The National Workshop**

1. Introduction: Include the origin of the activity and a description of its major objectives; an outline of official arrangements, contributions of participating agencies and organizations; brief description of the staff and participants, followed by a paragraph of acknowledgement.
2. Organization and conduct of the training activity: Gives a general description of the programme followed, methods used, discussion groups held, field trips organised and papers produced.
3. Summary of lectures, visits, findings, and discussions-where the lectures and discussions may be of importance for information or reference, a summary should be made, which may form the longest part of the report.
4. Conclusion and Recommendations: This section should consist of a summary evaluation of results and findings, together with recommendations on their use and on specific follow-up activities in the participating countries.
5. Appendixes: List of staff and participants (with official titles and addresses); list of documents; timetables and itineraries; and charts, maps or other supporting material required.



## **APPENDIX 3.3: EXAMPLE OF TERMS OF REFERENCE FOR INTERNSHIP, LEAP-TRAINING**

Terms of reference for internships in preparing a national training course on integrating wood into energy modelling studies for the application of the LEAP model in wood energy planning in Lao PDR.

### **Background**

Objective 1 of RWEDP aims to contribute to an improved database on wood energy at regional and national level and to improve the capacity of institutions to generate, manage and assess such data at regional, national and sub-national levels. An expected output of this objective is (Output 1.1) the identification of methodologies and techniques to collect, manage and assess data for wood energy planning. One of the activities needed to achieve this output is to formulate criteria for energy planning models which can be used for assessing and planning wood energy strategies within an integrated energy-economy-environment planning framework (Act. 1.1.4). RWEDP has identified LEAP as a planning model that satisfies the criteria required for integrating wood into energy planning. As such, another activity of RWEDP is to assist participating countries in identifying energy planning models most suited to their individual needs (Act. 1.1.7) and in developing their capabilities in the application of the energy planning model identified. These activities are intended to be achieved through national training courses.

RWEDP encourages the direct role of national experts in preparing national training courses with the guidance of its experts. As part of the preparation activities for this training course, RWEDP invites national experts to come to its office in Bangkok, Thailand to work as interns under the supervision of the wood energy planning expert. The internship provides the national experts with a period of close interaction with the RWEDP expert in developing the training program. The national experts will also acquire the capabilities to oversee the preparation and implementation of the training course to its completion.

### **Tasks of Interns**

The national experts (interns) will have the following specific tasks:

#### **I. Tasks before internship:**

- A. Identify past, current and planned data collection activities that include wood energy data.
- B. Collect available data needed for application of LEAP model (see Appendix for types of data needed).
- C. Prepare a preliminary report on the current situation on the use and supply of wood energy.

#### **II. Tasks during internship:**

- A. Study the capabilities of the LEAP model by going through the examples and exercises.
- B. Learn the data requirements in the use of the LEAP model.
- C. Learn to format data as required in the use of the LEAP model and identify the data gaps.
- D. Identify possible additional exercises that can be undertaken using own country data.
- E. Prepare a training schedule composed of presentations, discussions and exercises.

- F. Define the desired profile of training course participants.
- G. Identify the agencies and institutions which should send participants to the training course.
- H. Identify additional support from RWEDP for the preparation of training.
- I. Map-out the logistical and administrative activities required in the training course.

### III. Tasks after internship:

- A. Collect data left out in the earlier secondary data collection activities.
- B. Prepare data for use in LEAP exercises using own country data.
- C. Direct preparation for the national training on LEAP application.

### RWEDP Contribution:

RWEDP will fund travel and living allowance costs (US\$52 /day for up to 15 days) of two national experts from the Department of Planning, SPC.

### Appendix: Data Required in the Use of LEAP in Area-Based Energy Planning Focusing on Wood Energy

Note: Area refers to a political division such as country, region, state, province, county or district.

#### I. Socio-Economic Data

- A. Population Data
  - 1. Population growth: Growth rate or time series data on number of population, disaggregated by sub-areas (e.g. political sub-divisions), disaggregated by location (e.g. large urban areas, small urban areas and rural areas).
  - 2. Household growth trends: Growth rate or time series data on number of households, disaggregated by location, disaggregated by household incomes.
- B. Economic Data
  - 1. GNP and GDP growth trends: Growth rate or time series data on GNP and GDP data disaggregated by sectors.
  - 2. Industrial growth trends: Growth rate or time series data on the volume of industrial production (given in volume or weight units of production), disaggregated by scale of industry (e.g. home-based, informal, cottage, small-scale), disaggregated by types of industry (food processing, brick, tobacco, etc.).
  - 3. Service sector growth trends-growth rate or time series data indicating level of activities of the service establishments (e.g. number of persons served, financial income, etc.), disaggregated as follows:
    - a) institutions and non-commercial establishments (e.g. schools, temples, hospitals);
    - b) commercial establishments (e.g., hotels, restaurants, eateries).
- C. Financial Data
  - 1. Real discount rate
  - 2. Inflation rate
  - 3. Base year of monetary unit

## II. Demand Data

### A. Household Sector

1. Specific household energy consumption: One-time data on energy consumption in households, disaggregated by location, disaggregated by household income levels, disaggregated by energy end-uses, disaggregated by energy devices and fuels used; or
2. Household energy consumption trends: Growth rate or time series data on energy consumption in households, disaggregated by location, disaggregated by household income levels, disaggregated by energy end-uses, disaggregated by energy devices and fuels used; or
3. Elasticity data: Changes in fuel consumption as a function of changes in household incomes and changes in fuel prices per location per type of fuel.

### B. Industry Sector (limited to wood and biomass-using industries)

1. Specific industrial energy consumption: One-time data on energy consumption in industries, disaggregated by scale and type of industry, by energy end-uses, by energy devices and fuels used; or
2. Industrial energy consumption trends: Growth rate or time series on energy consumption in industries, disaggregated by scale and type of industry, by energy end-uses, by energy devices and fuels used; or
3. Elasticity data: Changes in fuel consumption as a function of changes in fuel prices per scale per type of industry.

### C. Service Sector

1. Specific energy consumption by service establishment: One-time data on energy consumption by service establishments, disaggregated by types of establishments, by energy end-uses, by energy devices and fuels used; or
2. Service sector energy consumption trends: Growth rate or time series data on energy consumption by service establishments, disaggregated by types of establishments, by energy end-uses, by energy devices and fuels used; or
3. Elasticity data: Changes in fuel consumption as a function of changes in fuel prices per type of service establishment.

## III. Transformation Data

### A. Charcoal Production

1. data on
  - a) type of process/equipment used and efficiencies
  - b) their capacities and specific volumes of production
2. one-time data or time-series data on
  - a) number of processes/items of equipment used
  - b) importation and exportation of charcoal
  - c) charcoal prices

### B. Other Wood Energy Transformation Processes (e.g., briquetting, gasification, ethanol production, etc.)

- a) types of processes/equipment used and efficiencies
- b) their capacities and specific volumes of production

- c) number of items of equipment/processes used

#### IV. Biomass Data

- A. Land Areas: Land area disaggregated by sub-areas, types of wood productivity zones, and types of land-uses
- B. Land-Use Change: Patterns of change of land use disaggregated into sub-areas, wood productivity zones, and land-use
- C. Wood/Biomass Requirement: One-time or time series data on allocation fraction of wood/biomass fuels, disaggregated by sub-areas and by types of wood/biomass as follows;
  - 1. wood fuels (disaggregated into firewood and wood for charcoal)
  - 2. dung fuels (disaggregated by types of animal dung)
  - 3. crop and crop wastes fuels (disaggregated into bagasse and other vegetal wastes)
  - 4. non-energy wood products (disaggregated into building poles and commercial wood)
- D. Wood/Biomass Transport: One-time or time series data on the importation/exportation (i.e., transport and trade) of wood/biomass between sub-areas, disaggregated by sub-areas, by types of wood/biomass as follows:
  - 1. wood fuels
  - 2. crop and crop wastes fuels
  - 3. non-energy wood products
- E. Wood Milling: Data on residues generated in non-energy wood production and the types of fuels these residues substitute, disaggregated by sub-areas, by types of non-energy wood products and by types of fuels substituted for (i.e. wood fuels, dung, vegetal fuel)
- F. Wood/Biomass Fuel Resources:
  - 1. types of wood/biomass resource produce, disaggregated by sub-areas, by types of wood productivity zones, and by types of land-uses, and information on whether all stocks are cleared when being converted from one land-use type to another
  - 2. inventory of wood resources: data on wood biomass resource potential disaggregated by sub-areas, types of wood productivity zones, and types of land-uses. Data required are as follows:
    - a) sustainable wood yield
    - b) standing stock of wood
    - c) access fraction for wood fuels
    - d) wood growth patterns-default data provided by LEAP for some land-use types
  - 3. inventory on dung fuel resources (data need to be disaggregated by sub-areas):
    - a) type of animals and their population growth trend
    - b) dung production per animal per year
  - 4. inventory on crops and crop fuels (should be disaggregated by sub-areas and types of land-uses):
    - a) types crops and trends in amount of crops harvested

- e) amount of crop fuel produced per unit of crop harvested
- G. Harvested Non-Energy Wood Resources: Data need to be disaggregated by sub-areas, types of wood productivity zones, and types of land-uses):
- 1. trends in amount of wood harvested
  - 2. percentage of wood waste
  - 3. percentage of wood waste used as fuel substitute
- V. **Evaluation Data**
- A. Demand Cost Data
- 1. cost of changing activity levels: For evaluating increases in wood/biomass fuel-using activities, disaggregated by type of wood/biomass fuel using activities/devices:
    - a) initial cost of wood/biomass fuel using devices
    - b) escalation cost
    - c) foreign exchange cost
    - d) age of device
  - 2. cost of changing energy intensities: Data on cost of increasing efficiency of wood/biomass fuel use, disaggregated by type of wood/biomass fuel using activities/devices:
    - a) cost per unit energy saved
    - b) escalation cost
    - c) foreign exchange cost
  - 3. One-time or time-series data on buying price of wood fuels
- B. Transformation Cost Data (should be disaggregated by types of wood energy transformation processes used):
- 1. capital cost
  - 2. fixed and variable operating and maintenance costs
  - 3. escalation cost
  - 4. foreign exchange cost
  - 5. one-time or time-series data on selling price of "processed" wood fuels
- C. Biomass Cost Data
- 1. wood scarcity response costs (default data provided by LEAP)
  - 2. special land-type costs-default data provided by LEAP
  - 3. one-time or time-series on "farmgate" selling price of wood fuels
- VI. **Environmental Data (Default data provided for by LEAP)**
- A. Fuel Composition: carbon, sulphur, nitrogen, ash and moisture content of various types of wood/biomass fuels
- B. Energy content and density of various types of wood/biomass fuels
- C. Types of global warming gases produced in the use of wood/biomass fuels and their environmental effects

## **APPENDIX 3.4: EXAMPLE OF TERMS OF REFERENCE FOR A CASE STUDY ON WOOD ENERGY PLANNING**

Terms of reference case study on data collection, assessment and analysis for wood energy planning for China.

### **Background:**

Objective 1 of RWEDP aims to contribute to an improved database on wood energy at regional and national level and to improve the capacity of institutions to generate, manage and assess such data at regional, national and sub-national levels. Two of the expected outputs from this objective relevant to this case study are (Output 1.1) the identification of methodologies and techniques to collect, manage and assess data for wood energy planning and (Output 1.2) analytical quantitative national overviews of patterns of production, distribution and utilization of wood energy, their linkages with the rural economy, the energy, forestry, agriculture, environment and other relevant sectors.

To achieve this objective and corresponding outputs, RWEDP proposes to conduct a case study on data collection, assessment and analysis for wood energy planning in the country. The case study will be done at different planning levels as described in the proposed activities and will use the LEAP energy planning model as the tool for assessment and analysis of wood energy plans.

### **Implementing Organization**

RWEDP proposes to work with the MOA Institute of Energy and Environmental Protection (IEEP) in the implementation of the case study. IEEP has been the main national research and training institute in China providing support to the MOA in the implementation of the Integrated Rural Energy Development (IRED) Program wherein wood energy is a major concern. IEEP is currently linked with RWEDP in pursuing activities related to wood energy development in China, particularly in the area of wood energy planning.

IEEP is expected to link up with the MOF, particularly the Research Institute of Tropical Forestry in providing technical inputs in the case study and with the various national and local implementing agencies involved in the IRED program in the provinces and counties to be studied. It will be the local implementing agencies (the Rural Energy Offices in particular) which will be conducting the studies at the provincial and county levels.

### **Proposed Activities**

There will be three levels of studies: national, provincial and county levels. The national-level study on the application of the LEAP model will be based on secondary data collected from national agencies and institutions. Data which are not available will be substituted for by appropriate assumptions decided by national experts from IEEP and RITF.

The provincial-level studies on the application of the LEAP model will be based on secondary level data collected from provincial agencies and institutions plus whatever useful data are available from national agencies. Again, data which are not available will be substituted for by appropriate assumptions decided by national experts from IEEP and RITF in consultation with experts from the provinces. Two provinces are proposed for the case studies: Henan in Central China and Yunnan in Southwest China. RWEDP can discuss with IEEP regarding the carrying out of an additional case study for Beijing and its surrounding counties.

The county-level studies on the application of the LEAP model will be based on secondary data collected from county-level offices and provincial agencies and institutions and any useful data available from national agencies. Data which are not available will either be collected through the use of short-term collection techniques (such as RRA, PRA, sampling surveys, key informant interviews, etc.) or substituted for by appropriate assumptions. National and provincial experts, in consultation with county officials, will decide which data will have to be collected through short-term collection techniques and which will use assumptions. In Henan, it is proposed that study be done in Xixia County. In Yunnan, the county has yet to be identified. If Beijing is included in the study, it is proposed that the study be done at Huaroi County.

### **Expected Outputs:**

- I. Data Collection at County Level ( To be conducted by County Rural Energy Office)
  - A. Collection of secondary data needed for LEAP modelling studies.
  - B. Identification of primary data collection activities to be conducted.
  - C. Collection of selected primary data.
  - D. Identification of institutional co-operation activities and tasks at the county level.
  
- II. Planning at the County Level ( To be conducted by the Provincial Rural Energy Office)
  - A. Review and analysis of secondary data collected for county-level application of LEAP modelling studies.
  - B. Application of LEAP at a selected county (one county each per province)-exercises in county-level wood energy planning and program formulation.
  - C. Identification of data gaps and possible substitute values available from literature.
  - D. Identification of primary data collection activities at the county-level.
  
- III. Data Collection and Planning at the Provincial Level (To be conducted by the Provincial Rural Energy Office in co-operation with appropriate provincial level agencies)
  - A. Collection of secondary data needed for LEAP modelling studies. Identification of:
    1. available data
    2. who collects these data and how frequently
    3. techniques used for collecting and assembling the data
    4. definition of terminologies used in the data system
  - B. Identification of data gaps and possible substitute values available from national and international literature.
  - C. Collation, review and organization of secondary and primary data collected at the county level.
  - D. Application of LEAP at the provincial level (i.e.; Henan and Yunnan)-exercises in provincial-level wood energy planning and policy and strategy formulation.
  - E. Identification of primary data collection activities to be conducted at the provincial level.
  - F. Identification of institutional co-operation activities and tasks at the provincial level.
  
- IV. Data Collection and Planning at the National Level (To be conducted by IEEP in co-operation with MOA (DEPE and DOP) and MOF (RITF and DOP)):
  - A. Collection of secondary data needed for LEAP modelling studies. Identification of:
    1. available data
    2. who collects these data and how frequently
    3. techniques used for collecting and assembling the data
    4. definition of terminologies used in the data system
  - B. Identification of data gaps and possible substitute values available from national and international literature.

- C. Application of LEAP at the national level (with provinces as sub-areas?): exercises in national wood energy planning and policy and strategy formulation.
- D. Identification of primary data collection activities to be conducted at the national level.
- E. Identification of institutional co-operation activities and tasks at the national level.

**Duration of the Case Studies**

The case studies should be implemented over a one year period.

**Inputs from RWEDP:**

Activities	Cost <sup>4</sup>
1 Two-week LEAP training for IEEP, MOA (DEPE and DOP), MOF (DOP and RITF), provincial, and selected county rural energy offices, including a workshop on implementing the case studies.	
2 RWEDP contribution to the national level case study.	
3 RWEDP contribution to the provincial level case studies.	
4 RWEDP contribution to the county level case studies.	

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<sup>4</sup> A preliminary budget was submitted by IEEP to Reporting Officer.



## **APPENDIX 4.1 WOOD ENERGY CONSERVATION GROUP ACTIVITIES, 1994–AUG. 1997**

1. Regional workshop on “Stoves for institutional use and small scale industries”, June 1995 in Yogyakarta, Indonesia,
2. Regional workshop on “Stoves for use with agro residues”, October 1995 in Hanoi, Vietnam,
3. Expert consultation on “Selection criteria for assistance to small scale industries” , January 1996 in Penang, Malaysia.
4. Regional workshop on “Stoves used for space heating and cooking at different altitudes and/by ethnic groups”, February 1996 in Pokhara, Nepal.
5. National workshop on “Wood based energy systems for rural industries and village applications”, March 1996 in Peshawar, Pakistan.
6. National workshop on “Wood based energy systems for rural industries and village applications”, October 1996 in Dhaka, Bangladesh.
7. National workshop on “Household energy”, November 1996 in Siem Reap, Cambodia.
8. National workshop on “Development and Implementation of ICs programmes”, November 1996 in Mataram, Indonesia.
9. Expert consultation on “Modern Industrial Biomass Energy Technologies”, January 1997 in Kuala Lumpur, Malaysia.
10. Regional “Training for Trainers on Improved Stove Selection and Dissemination”, June 1997 in Mataram, Indonesia.

## **APPENDIX 4.2: PLANNED WOOD ENERGY CONSERVATION GROUP ACTIVITIES, SEPT. 1997–1999**

1. Regional training on “Charcoal Production Technology”, October–November 1997 in Pontianak, Indonesia
2. National workshop on “Woodfuel Production, Trade and Use in Lao PDR”, scheduled for November 1997 in Vientiane, Lao PDR
3. National workshop on “Development and Implementation of ICs Programmes”, tentatively planned for late 1997–early 1998 in Sylhet, Bangladesh
4. National workshop on “Development and Implementation of ICs Programmes”, tentatively planned for March–April 1998 in Hanoi, Vietnam
5. National workshop on “Development and Implementation of ICs Programmes”, tentatively planned for early 1998 in Kathmandu/Dulikhel, Nepal
6. National workshop on “Development and Implementation of ICs Programmes”, scheduled to be held in Kompong Chhnang, Cambodia (postponed from August 1997)
7. Various expert consultations on biomass using rural industries (bricks and roof tile industries, lime burning, tobacco curing, small scale sugar processing, timber drying), scheduled to be spread over 1998 and early 1999.

## APPENDIX 5: QUESTIONNAIRE ON ENERGY POLICIES AND INSTITUTIONS

Country	National energy policy?	Integrated wood energy policy?	Separate wood energy policy?	What steps are being taken to establish wood energy policy?	What institutions are responsible for the development and promotion of biomass / wood energy?
<b>Bangladesh</b>	+	+	+		<ol style="list-style-type: none"> <li>1. Forest Department, Ministry of Environment and Forests</li> <li>2. Forest Research Institute</li> <li>3. Fuel Research Institute Dhaka</li> <li>4. Bangladesh Agri-Research Council Dhaka</li> </ol>
<b>Bhutan</b>	+	-	-	Institutionalization of relevant sector and data collection initiated	<ol style="list-style-type: none"> <li>5. Forest Services Division</li> <li>6. Trade and Industry Division</li> <li>7. Division of Power</li> <li>8. National Women Association of Bhutan</li> <li>9. Rural Society Protection of Nature</li> <li>10. Private Workshops Manufacturing Stoves,</li> <li>11. National Environmental Commission</li> </ol>
<b>Cambodia</b>	+	+	+		<ol style="list-style-type: none"> <li>12. Forestry Department, Ministry of Forestry and Fisheries</li> <li>13. Department of Energy, Ministry of Industry and Mines</li> </ol>
<b>China</b>	+	+	+	The Policy for Rural Energy Development includes woodfuel	<ol style="list-style-type: none"> <li>14. The National Steering Group,</li> <li>15. Department of Rural Energy and Environment Promotion, Ministry of Agriculture</li> <li>16. Academies/universities</li> </ol>
<b>India</b>	-	-	-	A National Renewable Energy Policy in preparation, biomass is included in the draft.	<ol style="list-style-type: none"> <li>17. Ministry of Non-Conventional Energy Sources</li> <li>18. Ministry of Environment and Forests</li> <li>19. State/Union Territory Renewable Energy Department/Agencies</li> <li>20. Research and Development Groups in University</li> <li>21. Non-Governmental Organizations</li> <li>22. Public Sector Undertakings</li> <li>23. Private Industries</li> </ol>
<b>Indonesia</b>	+	+	+		<ol style="list-style-type: none"> <li>24. Ministry of Forestry, D.G. of Reforestation and Land Rehabilitation,</li> <li>25. Forest Research Institute</li> <li>26. Ministry of Mines and Energy D.G. of Electricity and Energy Development</li> <li>27. National Planning Development Board</li> <li>28. Ministry of Finance</li> <li>29. Universities</li> <li>30. Regional Government (Provincial Level)</li> <li>31. Private sector (through the coordination and direction from the Government)</li> </ol>
<b>Lao</b>	+	+	+		<ol style="list-style-type: none"> <li>32. Ministry of Agriculture and Forestry</li> <li>33. Science Technologies Environment Organization</li> <li>34. Ministry of Industry and Handicraft</li> <li>35. State Planning Committee</li> </ol>

Country	National energy policy?	Integrated wood energy policy?	Separate wood energy policy?	What steps are being taken to establish wood energy policy?	What institutions are responsible for the development and promotion of biomass / wood energy?
Malaysia	+	-	-	Establishment of fifth energy policy. Fifth energy policy will incorporate NRSE and biomass energy as one of the components	<ol style="list-style-type: none"> <li>1. Forest Research Institute Malaysia</li> <li>2. Palm Oil Research Institute Malaysia</li> <li>3. Standards Research Institute Malaysia</li> <li>4. Rubber Research Institute Malaysia</li> <li>5. Malaysian Agriculture Research Institute</li> <li>6. Centre for Environment Development</li> <li>7. Technology University of Malaysia</li> <li>8. Agriculture Research Institute Malaysia</li> <li>9. University of Malaysia</li> </ol>
Maldives	+	-	-		Ministry of Fisheries and Agriculture
Myanmar	+	+	+		<ol style="list-style-type: none"> <li>1. Forest Department</li> <li>2. Dry Zone Greening Department</li> <li>3. Myanmar Science Technology Research and Development Department</li> <li>4. Forest Research Institute</li> </ol>
Nepal	+	+	+		<ol style="list-style-type: none"> <li>5. Department of Forest</li> <li>6. Timber Corporation of Nepal</li> <li>7. Forest Development Board</li> <li>8. Forest Users Groups</li> <li>9. Ministry of Agriculture (Agri-Biomass)</li> <li>10. Department of Soil and Water Conservation</li> <li>11. Department of National Parks and Wildlife</li> <li>12. NGOs and Private</li> <li>13. Water and Energy Commission Secretariat</li> </ol>
Pakistan	+	-	-	<ul style="list-style-type: none"> <li>• More focus on biomass along with modern fuels in National Plans</li> <li>• Conserving forest, providing easy access to alternative fuels in remote areas.</li> <li>• PFI is undertaking tree plantation</li> <li>• Biomass/wood energy has been brought into the energy profile</li> <li>• National Forest Policy (1991) promotes tree planting for fuelwood purposes</li> </ul>	<ol style="list-style-type: none"> <li>14. Energy Wing Planning and Development Division</li> <li>15. Ministry of Forest Environment and Rural Development</li> <li>16. Ministry of Science and Technology</li> <li>17. Provincial Forestry Department</li> <li>18. Ministry of Petroleum and Natural Resources</li> <li>19. Ministry of Water and Power</li> <li>20. Ministry of Women Development (advisory role)</li> <li>21. Pakistan Council of Appropriate Technology</li> <li>22. Ministry of Environment and Forests</li> <li>23. Provincial Forest Department</li> <li>24. NGOs</li> <li>25. Provincial Forest Department</li> <li>26. Pakistan Appropriate Technology</li> </ol>

Country	National energy policy?	Integrated wood energy policy?	Separate wood energy policy?	What steps are being taken to establish wood energy policy?	What institutions are responsible for the development and promotion of biomass / wood energy?
<b>Philippines</b>	+	+	+		<ol style="list-style-type: none"> <li>1. Department. of Energy-Non Conventional, Energy Division</li> <li>2. Department. of Science and Technology, Fuel Energy Division</li> <li>3. Department. of Environment and Natural Resources, Forest Management Bureau</li> <li>4. Department. of Agriculture</li> <li>5. Academic Institution/State Universities</li> <li>6. Philippines. National Oil Company</li> <li>7. Forest Product Research and Development Institute</li> </ol>
<b>Sri Lanka</b>	+	+	-	<ul style="list-style-type: none"> <li>• Establishment of a national committee with representatives from all institutions responsible for wood fuel production and use.</li> <li>• Preparation of a policy paper on wood energy</li> </ul>	<ol style="list-style-type: none"> <li>8. Forest Department, Ministry of Forestry and Environment</li> <li>9. Ministry of Irrigation Power and Energy</li> <li>10. Ministry of Science and Technology</li> <li>11. Energy Conservation Fund</li> <li>12. Department of Agriculture</li> <li>13. Rural Development Division, Ministry of Policy Planning</li> <li>14. NGOs</li> <li>15. National Planning Department</li> </ol>
<b>Thailand</b>	+	+	+		<ol style="list-style-type: none"> <li>16. Department of Energy Development and Promotion</li> <li>17. Royal Forest Department (MOAC)</li> <li>18. Agriculture Extension Department (MOAC)</li> <li>19. Department of Civil Work</li> <li>20. Army</li> <li>21. Chulalongkorn University</li> <li>22. King Mongkut Institute of Technology</li> <li>23. Prince Songkla University</li> <li>24. Chiangmai University</li> <li>25. Kasetsart University</li> </ol>
<b>Vietnam</b>	+	+	-	<ul style="list-style-type: none"> <li>• Data collection</li> <li>• Survey of people's opinions</li> <li>• Study on wood fuel markets</li> <li>• Formulation of policies</li> </ul>	<ol style="list-style-type: none"> <li>26. Forestry enterprises (producers)</li> <li>27. Forestry co-operation (producers)</li> <li>28. Farmers</li> <li>29. Department for Forestry Development, Ministry of Agriculture and Rural Development.</li> <li>30. Forest Science Institute</li> <li>31. Institute of Energy</li> <li>32. Ministry of Science, Technology and Environment</li> </ol>

Country	State the barriers that your country faces in setting up these institutions	What are the problems the established institutions face in carrying out their tasks and responsibilities?	How can RWEDP assist your country in setting up institutions or strengthening existing institutions?
<b>Bangladesh</b>			
<b>Bhutan</b>	<ul style="list-style-type: none"> <li>Lack of infrastructure/facilities</li> <li>No adequate skilled man-power</li> <li>No formal institutions established which looks after fuel wood aspect</li> </ul>		<ol style="list-style-type: none"> <li>Conducting workshop/training at national level on data collection, management</li> <li>Assist in the formulation of national wood energy policy</li> <li>Assist in efficient utilization of wood energy, including end use application efficiency</li> <li>Assist to develop/support the establishment of wood energy co-ordination/implementation body</li> </ol>
<b>Cambodia</b>	The war situation in the country		Setting up bilateral and multilateral organizations in the wood energy scene
<b>China</b>	Lack of technologies to transfer wood into high quality energy	<ul style="list-style-type: none"> <li>Lack of funds</li> <li>Need for co-ordination</li> </ul>	Assist in carrying out a case study on China
<b>India</b>			<ol style="list-style-type: none"> <li>Conduct manpower training</li> <li>Providing expert services</li> <li>Giving budgetary support</li> <li>Exchange of information</li> </ol>
<b>Indonesia</b>	<ul style="list-style-type: none"> <li>There is no integrated plan</li> <li>Lack of funds</li> <li>Many actors/institutions should be involved in the development</li> </ul>	<ul style="list-style-type: none"> <li>General guidance in national level development program</li> <li>Lack of funds to establish new institution</li> <li>Technology, actors, policy, market and financial system</li> </ul>	<ol style="list-style-type: none"> <li>Organize one day sessions for the senior official</li> <li>Increase research and development, and demonstration projects</li> <li>Improve training on wood energy technology/conservation</li> <li>Enhance international cooperation</li> <li>Enhance the role of private sectors.</li> </ol>
<b>Lao</b>	<ul style="list-style-type: none"> <li>Lack of experiences</li> <li>Lack of funds</li> </ul>		<ol style="list-style-type: none"> <li>Formulate a National Wood Energy Planning Project and fund it</li> <li>Provide national and international training courses/workshops/seminars</li> <li>Establish a data collection network in the country and support it.</li> </ol>
<b>Malaysia</b>		<ul style="list-style-type: none"> <li>Sufficient qualified manpower</li> <li>Conflicting policy statements</li> <li>Lack of co-ordination</li> <li>Incomplete/unreliable data base</li> <li>Lack of funds</li> </ul>	<ol style="list-style-type: none"> <li>Come up with standard formats for data collection</li> <li>Improve networking amongst member countries</li> <li>Continue with wood energy news</li> <li>Distribute information on new developments on wood energy</li> <li>Expand the scope to cover agricultural residues</li> </ol>
<b>Maldives</b>		<ul style="list-style-type: none"> <li>Trained personnel</li> <li>Non availability of appropriate technologies and inputs</li> </ul>	<ol style="list-style-type: none"> <li>Conduct training courses</li> <li>Transfer appropriate technology</li> <li>Assess use and need of wood energy</li> <li>Facilitate linkages with regional institutions</li> </ol>

Country	State the barriers that your country faces in setting up these institutions	What are the problems the established institutions face in carrying out their tasks and responsibilities?	How can RWEDP assist your country in setting up institutions or strengthening existing institutions?
Myanmar			<ol style="list-style-type: none"> <li>1. Exchange experiences, technologies</li> <li>2. Develop implementation of the LEAP model</li> <li>3. Co-ordinate between member countries,</li> <li>4. Conduct training courses such as ICS, charcoal making; data base information</li> </ol>
Nepal			<ol style="list-style-type: none"> <li>5. Provide dynamic information</li> <li>6. Provide training to trainers and technical support on local national training courses.</li> <li>7. Provide technical support to establish pilot projects on area based biomass energy demand management.</li> <li>8. Provide initial support for efficient wood energy technologies</li> </ol>
Pakistan		<ul style="list-style-type: none"> <li>• Wood/Biomass is not recognized as an important energy source at the national policy level</li> <li>• Lack of financial resources</li> <li>• Need for development of linkages between wood producers and wood consumers</li> </ul>	<ol style="list-style-type: none"> <li>9. Increase awareness at senior policy level</li> <li>10. Sponsor small R and D projects for specific national needs</li> <li>11. Strengthen the establishment of data bases</li> <li>12. Prepare/develop training manuals for forestry professional/technicians</li> </ol>
Philippines		<ul style="list-style-type: none"> <li>• Insufficient funding</li> <li>• Each organization has its own priorities</li> <li>• Lack of system for the inventory of wood energy resource base</li> <li>• Lack of manpower</li> </ul>	<ol style="list-style-type: none"> <li>13. Assist in the carrying out of case studies</li> <li>14. Assist in the organization of HRD</li> <li>15. Continuously provide information</li> </ol>
Sri Lanka	Lack of co-ordination	<ul style="list-style-type: none"> <li>• Lack of inter ministerial co-ordination</li> </ul>	<ol style="list-style-type: none"> <li>16. Organize policy making seminar for top officials</li> <li>17. Assist in forming a national committee on wood energy</li> <li>18. Organize a regional trainers training course and courses on data base establishment, resource assessments, modern conversion technology, etc.</li> <li>19. Support dissemination of wood energy information to field level officers/bureaucrats through local language</li> </ol>
Thailand		<ul style="list-style-type: none"> <li>• Each institution run their activities independently</li> <li>• Co-operation is very loose</li> </ul>	
Vietnam			