

## **GATE – 1983/1 – Testing Handpumps**



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# **GATE – 1983/1 – Testing Handpumps**

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## **Editorial**

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## **Dear Readers,**

Publishers and editors received an altogether positive echo for their first edition of "gate". From AT experts and media people, which pleases us. But also from people not at home in this "scene": which pleases us particularly.

For "gate " is not only directed at "insiders" at specialists, engineers and technicians. We want to reach also those who play an important part in the planning and implementation of development measures: Economists, sociologists, ecologists, town and regional planning experts. And of course the policy–makers and

decision-makers here and abroad, in our partner countries.

In addition to providing information, suggestions on how to find solutions to certain problems and project difficulties, and describing the work of partners in projects and cooperation, "gate" wants very much to increase awareness of the whole field of "technologies for developing countries".

Experience shows that layout and contents must fit together if the potential reader is to accept both. For "gate" this means: Apart from an attractive layout of the journal, its contents must be presented in a stimulating way. That is why we try to find a language and a way of presentation which are understandable, and which are acceptable for the layman.

By the way, we may perhaps slap our back a little bit: We have discovered the opening in the market; even requests and suggestions for German edition of "gate" are piling up. We will decide on that some time during the next weeks.

Hans-Wilhelm von Haugwitz

## Focus

### Handpumps – they are cheap, but are they effective?

GTZ Cooperation with many Developing Countries and International Organisations

by Hans-Helmuth Neher

The United Nations have declared the years 1981 – 1990 to be the International Drinking Water Supply and Sanitation – Decade (IDWSSD). It is one of the objectives of this decade to provide people in all countries with potable water of sufficient quality and quantity. One contribution to achieve this goal will be made by a worldwide programme, carried out jointly by the World Bank and the United Nations Development Programme (UNDP), and designed, among other things, to foster the development and promotion of handpumps. The German Agency for Technical Cooperation (GTZ) takes part in this programme and is working in a number of countries of the Third World; the most recent scheme in this connection is the beginning of a cooperation with the People's Republic of China.

In the mid-70s, estimates by the World Bank and the World Health Organisation (WHO) came up with the frightening fact that some 75 per cent of the people in the developing countries have no access to hygienically clean drinking water; excluding the People's Republic of China, this figure equals about 1.5 billion people the majority of which are living in rural areas. And this situation threatens to grow even worse: With the increase in population density the availability of spring and surface water is being steadily reduced.

Handpumps are still best suited to alleviate the drinking water supply crisis because they are cheap. Moreover, the borehole's or well's surface can easily be sealed (by means of a concrete lid) against foreign substances that might lead to contaminations and thus health risks something which cannot be done with "open" waterholes.

Handpumps have been known in almost all countries for about one or two years. Handpumps of varying types and for many purposes are used especially in countries which formerly had been colonies. It is hardly possible any more to enumerate all developments or individual models ("Catchword", page 6, explains their functions).

In rural regions where groundwater must be brought up from an achievable depth, handpumps are usually the only adequate means. A handpump programme costs between US \$ 0.50 and US \$ 3 per inhabitant, depending upon the number of inhabitants and the prevailing geological factors.

To bring up water by means of electrical pumps or combustion engine pumps is inadequate – except in cases where the depth is considerable –, as quite often electricity is not available or the installation and maintenance of the equipment are too expensive (up to four times as costly as handpumps).

Thus, as a result of IDWSSD and the rise in energy prices, handpumps have moved again to the foreground. It is expected that in the course of this decade some hundred thousands perhaps even millions of Handpumps will be newly installed.

## Test Programme

In the past, errors were committed quite often when selecting types of handpumps and their place of operation. For example, pumps were exported to the developing countries, which were either used in Europe or America to water small gardens or which were technically too sophisticated. This meant, as we know today, that in all these cases the life-span of these pumps was foreseeably short.

To avoid past mistakes and obtain a clear idea of the various types of pumps and their production, the British Overseas Development Administration (ODA) commissioned the Consumers Association (CA) Testing and Research in Harpenden, UK, to test twelve brands of hand-foot operated deepwell force pumps in a 4000 hour test. Criteria such as material, potential, safety hazards, resistance to contaminations, resistance to abuse, maintenance and repair, manufacturing and skills, suggested design improvements, etc. were to be examined.

This programme with CA has been continued since 1981 by the World Bank. At present, 18 further types of handpump are being tested. Another six will afterwards be tested upon request by the producers.

During the second half of 1984, a number of different pump models will be available for mass production furnished with the "quality stamp" of CA. As a result, aid organizations and developing countries might in future gear their decisions more and more to CA test results when selecting and using handpumps.



United Nations Symbol for the "International Drinking Water Supply and Sanitation Decade" (IDWSSD) 1981 – 1990.

## Water Turbine Test

At a closed down mill in the Odenwald near Frankfurt on Main, GATE is currently testing out a traditional water turbine. The turbine comes from Nepal, is made largely of wood and is used to drive grain mills. The results of the tests will be used in a project designed to reactivate indigenous technologies.

## Field Tests

As evaluations and laboratory tests are always incomplete, concrete findings can be gained only with field tests. Therefore several donor nations and international institutions such as UNICEF and UNDP/World Bank are cooperating closely in carrying out field tests of handpumps.

Within the scope of ongoing and future projects, cooperation of that type is taking place, with GTZ participation, in the following countries: Niger, Togo/Benin, Upper Volta, Zambia, Sri Lanka, Thailand, Indonesia, China, Egypt, Sudan, and some Latin American countries.

In order to obtain an overview on all field tests in connection with handpumps, the World Bank has established an annual Advisory Panel Meeting. In 1981 it took place on the Comore Islands, in 1982 in Malawi.

Soul Arlosoroff, Handpump Adviser and Project Manager at World Bank/UNDP, sums up the most significant results as follows: "Maintenance must be as simple and effective as possible . . . Pumps should be light, simple and manufactured by regular machine tools and extruding machines. The technology of VLOMP (Village Level Operation of Maintenance Pump) must be suitable for local manufacturing in the LDCs, for standardization and distribution of spare parts across the country to many outlets."

Accordingly, many developing countries have developed their own types of handpumps. Some examples are:

- The Blair Pump in Zimbabwe, developed at the Blair Research Institution Harare (formerly Salisbury);

- The Mark 11 by UNDP/World Bank/ UNICEF in India;
- The Malawi Pump, a development by UNDP/ODA;
- One of the cheapest pumps, the Bangladesh Pump (which costs US \$ 35 per piece), developed by UNICEF.

#### Cooperation with the People's Republic of China

The People's Republic of China has shown its interest vis-à-vis the World Bank/UNDP Project Management and also GTZ in being included in advisory and support services in connection with the development of handpumps and irrigation pumps. A first concept on such a cooperation was worked out during the visit of a World Bank/UNDP Mission from 7 June to 7 July 1982 between World Bank/UNDP, GTZ and China.

The Chinese Academy of Agriculture Machinery and Science (CAAMS) in the Ministry of Machine Building Industry is the counterpart organisation for GTZ in the handpump test programme. The Agency consists of eleven institutes with a total of 1,050 staff of which 500 are engineers and technicians.

The cooperation which is about to commence in the coming months will concentrate on the expansion of a test laboratory for drinking water and irrigation handpumps (deep well and shallow well pumps) and for material testing with a view to using locally manufactured parts, including plastic parts.

The long-term objectives of this cooperation are – among others – the following:

- a) Improvement and extension of potable water supply in rural areas where groundwater is available at a depth of up to 50 meters by means of handpumps.
- b) Increased food production through small plot irrigation by means of human and animal powered pumps in rain-fed areas with short-term (1–3 months) dry periods and in dry areas where groundwater is available at between one and five meters below surface.
- c) Field testing of selected pumps to verify performance in actual use.
- d) To develop a guide for the selection of handpumps and components best suited to particular installations, locations and applications.
- e) To publish a manual on the installation, operation and maintenance of handpumps.

Furthermore, Chinese experts are to be given the possibility in the course of the project activities to go to other countries (including the Federal Republic of Germany) for further training and information purposes. They will be sent to countries where experience in the field of production and use of handpumps is available. Technical Cooperation among Developing Countries (TCDC) is an important aspect of this project.

A final report on all activities in China will provide an assessment of the types of pumps likely to be available for the achievement of the IDWSSD in China and other countries. The report will include guidelines and propose methodologies for the laboratory and field-testing of pumps by others as part of the TCDC efforts in East Asia and other regions.

#### **Technology must serve the people**

"Appropriate" must always incorporate "appropriate for whom?"

by Hans-Wilhelm von Haugwitz

With his words "the clearest sign of inappropriateness of a design is that it has to be 'sold' to the people", the Deputy Director of UNICEF, Tarzie Vittachi from Sri Lanka, has brought up a principal issue in the last edition of "gate" (No. 1/82; see "Focus", page 3 – 5: Appropriate Technology – by whom? for whom? and how?). Hans Wilhelm von Haugwitz, Head of the Division GATE in the German Agency for Technical Cooperation (GTZ), gives a first answer with his following article. Will others among "gate" readers follow suit?

"Would you buy this cart?" was a question Tarzie Vittachi put to farmers in a village of his home-country, Sri Lanka, when they were shown a new improved bullock cart. The farmers replied that they would not buy it, not

even if they were given money into the bargain. They would borrow the same amount again and try to buy a small car.

Vittachi's conclusion: This Appropriate Technology (AT) is not what the farmer feels he needs. Farmers want to get away from the bullock age. Why should a car be inappropriate for a farmer if it is appropriate for the guest from the capital? asks Vittachi.

With two other examples Vittachi feels that he can prove experts for AT to miss the mark when planning for people's need and their development. He says that it is not the concept formulated by F. Schumacher which is wrong; it is applied wrongly and misunderstood. Lets have a few critical observations on this:

### 1. Appropriate to what?

Undoubtedly, the hopes connected with the concept of AT have not been fulfilled until now. There were many setbacks. The most important reason seems to be that "AT" was equated with "small and simple technologies."

Whoever bases their measures on this equation neglects something which Vittachi points out: Namely, that, in the first place, each technology must correspond to the need of its user, and secondly, that technologies always affect social structures and cause changes in social hierarchy and power structure.

The stronger the influence towards change of a new technology, the more reluctant will people be to use it – going as far as rejecting it altogether. And here usually a stage is reached where the impact of new technologies can no longer be overlooked. The people concerned are unable to assess the degree of changes in the social structure, be they negative or positive.

Thus, Appropriate Technology is not always a matter of technique, size, efficiency and simplicity in the first place, but rather of its appropriateness for man and its integration in the social system.

The people affected by it must be able to absorb a new technology which increases their productivity and helps them gain a better income; they must be able to handle it, maintain and repair it; they must be able to head off the changes caused by the new technology.

Appropriate Technology, therefore, is not small and simple as a matter of principle. It can just as well be big and complex.

This means that the technological level of a social group is decisive and forms the basis for any new technological solutions about to be introduced.

If most farmers are illiterate without any formal training, and if they have been working with bullocks and very simple tools until now, one must assume that a leap on the tractor cannot be absorbed by the farmers. They are unable to fulfill the need for service, maintenance, repair and organisation which an economic use of a tractor requires a farmer or craftsman to bring in.

I am quite confident, however, that all farmers working with bullocks are dreaming of the tractor age. Unfortunately, one typical failure of every dream is that it takes place outside any reality.

### 2. "Small" need not necessarily mean economical

Moreover, a technology must be adapted to the natural and economic conditions prevailing in its area of operation. One must agree with Vittachi in that many new technologies are not economical.

Here again, enthusiasts thought that a small and simple technological device would á priori be economical. This is not so. An example: Wood can be used much more efficiently in a cooker than in an open fire–place. Introducing cookers will, however, involve big problems if they cost between DM 50 and DM 100 whereas fuelwood could so far be procured free of charge. The family concerned does not see any economic incentive to buy such a device. And even less when DM 50 means quite a lot of money to a family with an annual income of perhaps DM 1,000.

### 3. The wishes of the people concerned

Vittachi deplores that too little account is taken of the wishes of those affected by a new technology. He says that people are spoken to, but not spoken with. Fundamentally, this is undoubtedly true.

But can we be really sure that the people concerned are able to articulate their wishes? In view of the experience made in the field of European agriculture, I doubt it. And even if they can speak out for what they want, does this make the problems disappear?

Let us take an example: A farmer keeps 15 head of Zebu cattle. These animals are very resistant to disease, can live on little food and are furthermore easy to keep. However, they give only little milk and meat.

Now the farmer wants to raise his income from cattle. Above all, he wants to produce more milk. So he needs more cattle giving more milk and he needs better fodder for the dairy cows.

The new cattle are less resistant to disease, they need more care and better fodder. New cultivation methods and new fodder varieties must be introduced to the farm in order to secure an adequate supply of fodder for the dairy cows. Furthermore, the number of cattle heads must be reduced so that the performance potential of the new cows can be exploited to the full by feeding them properly.

The only thing the farmer originally wanted to achieve was to produce more milk. As a consequence of this seemingly modest wish he was forced to introduce a bundle of new technological solutions on his farm.

#### 4. We need more patience

Efforts to find Appropriate Technologies as defined above for the developing countries are not very old. Are we not far too impatient if we expect effective solutions after only one decade or two?

We must bear in mind that technology should serve the people, that it must be geared to their abilities, must be adapted to what they can do. And man is not a standardised object, he is an individual.

Without an qualified extension service and, possibly, loans from the government he will not be able to succeed.

Did the farmer really comprehend the rather complex consequences of his simple desire? And – what is likely – if not, should his wish be fulfilled or not?

Progress and development always means breaking new soil, accepting new and unknown risks. Only very rarely will a farmer be in a position to define himself which new technologies to use in order to achieve certain goals.

All this had formerly also happened to the European farmer. A few progress-minded farmers developed, together with scientists and engineers, new techniques, others adopted them once they had stood the test. This process was not always an easy one and they committed many errors.

I wholeheartedly endorse the view that one must speak more with the farmer than hitherto about changes to be made on his farm. This can and must be done by qualified indigenous advisers who speak the farmer's language and know about his situation. Unfortunately, such advisers are only too often unavailable.

Moreover, a great number of techniques are offered, many of which are fascinating in terms of their technical efficiency. To select in each case the proper and suitable one still turns out to be a rather difficult venture. To solve this problem we still need more experience and knowledge.

## Catchword

### "Handpumps"

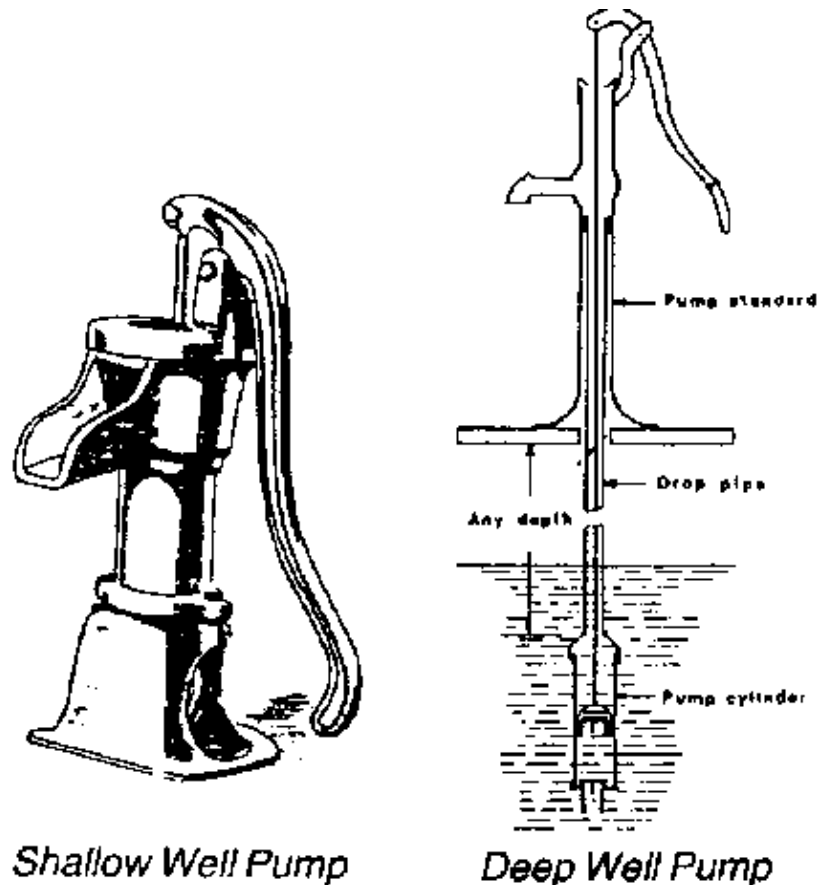
Several hundred million people already depend on handpumps for their drinking water. Major handpump programs are underway or planned in many countries of the Third World.

However, experience shows that many existing handpump supplies are deficient or have been abandoned altogether because of inadequacies in design, manufacture installation, operation and maintenance. A pump's failure may render a well useless. Design criteria are needed that can be used, particularly by developing countries, in meeting prevailing operating conditions as well as sanitary requirements.

Pumps are needed which are durable, trouble-free, sanitary, and inexpensive; which require maintenance within the limitations of local capabilities; which are easily operated and acceptable to users, and are suitable for local manufacture using local materials, equipment and manpower.

Water lifting devices or pumps powered by human energy have been in use since the dawn of history. The most common and widespread pump of this type is that known as the "single action, reciprocating, positive displacement pump". Or more familiarly, the "farmyard pump".

The technology of reciprocating handpumps may be further subdivided into two types: The shallow well handpump and the deep well handpump. In both pumps a plunger or piston, enclosed within a cylinder, lifts the water to the pump spout.



In the shallow well pump, the plunger and its cylinder are located above the water level – usually within the pump stand itself. This pump relies on atmospheric pressure to lift the water to the cylinder; thus it is limited to water lifts of about 22 feet (6.7 meters).

In the deep well pump, the cylinder and plunger are located below the water level in the well. This pump can lift water from wells as deep as 600 feet (180 meters). The forces and wear created by the hydraulic head increase with the depth to the water table. Also, the maintenance and repair problems associated with reaching the cylinders deep within the well are much more difficult than in shallow well pumps. Thus the design and costs of pumps for deep well use are more critical than for shallow wells.

The hydraulic design of the pumps is concerned with the rate of discharge, the head to be overcome in lifting the water, the structural forces generated by the lift, the energy input required, and the length and frequency of the plunger strokes transmitted by the handle.

These factors affect the design of the handle assembly, the pump stand, the bearings at handle assembly pivot points, the pump rod connecting the handle and the plunger assembly, the cylinder, and the water seal ("cup" or "bucket") between the plunger and the cylinder wall.

The basic technology is well known. Pumps of the reciprocating type were known in ancient times and have been in common use at least 200 years.

Today marks the renaissance of the handpump. The importance of its role in rural supplies in many developing countries, villages as well as farms, is widely recognized.

From: "Hand Pumps, for Use in Drinking Water Supplies in Developing Countries". Technical paper No. 10, July 1977, published under the joint sponsorship of the UNEP and the WHO. Prepared by F. Eugene McJunkin.

## **5000 Questions and 5000 answers**

Interim Report on the GATE Information Service India heads the Table by Klaus Wiesner and Peter Baz

Since it was set up in the summer of 1978, GATE has offered an information service on Appropriate Technologies (AT) to private and public institutions in developing countries concerned with the development, adaptation, introduction and dissemination of these technologies. Last year some 1,550 enquiries were answered by GATE's Question and Answer Service, bringing the total number to about 5,000 since 1978.

The object of GATE's information work is to suggest appropriate technical solutions for specific problems. The target group – in line with the "Basic Needs Strategy" launched by the Federal Ministry for Economic Cooperation in November 1978 – is made up of people working in agriculture, trades and small industries in the rural areas of the Third World.

A substantial part of GATE's information service consists in answering technological enquiries from developing countries. Since GATE is not normally in direct contact with the target group itself, most of the enquiries come from institutions in the developing countries which act as go-between for the target groups.

In order to promote the application, adaptation to local conditions, supervision and dissemination of technologies, over and beyond its information service, GATE cooperates with a number of partner institutions worldwide which also answer some of the enquiries within their region, in addition to the practical application of technologies. Despite this, GATE still receives about 120 enquiries per month.

AT GATE two officers are responsible for Latin America, two for Africa and two for Asia. They maintain contact with the partner institutions and answer the queries sent in from their area.

In order to answer the enquiries they must have access to specialised information. For this purpose GATE keeps a library of literature on AT and a file on plants and equipment. In the field of information and documentation, GATE collaborates within SATIS (Socially Appropriate Technology International Information Service).

In addition to GATE, about two dozen AT organisations from industrial and developing countries are currently cooperating within SATIS. All these institutions collect information about Appropriate Technologies. The documents are classified according to a uniform system. The SATIS Secretariat receives from each member index cards of the documents acquired from which it then compiles uniform catalogues and annotated bibliographies. In this way, each member, when searching for literature, can apply to every other member for information on a specific issue.

### The Practice

In its Question and Answer Service, GATE normally operates with the following instruments:

- Every applicant is sent an answering letter and information relating to his enquiry;
- GATE has prepared special publications, called modules, on subjects which are asked about most often, such as construction of biogas plants or smokeless cookers;
- in addition, GATE has built up a collection of articles, reports and references in "Technology Readers";
- on special subjects such as mud architecture, GATE puts out special publications;
- in response to specific questions, copies of relevant material from GATE's library are often sent out, as well as material obtained from other information systems;

– special enquiries concerning fields covered by divisions or sections within the GTZ are answered by these units themselves;

– in the case of particularly difficult questions, GATE has recourse to external sources of information, for example university institutes or individual experts.

Answering a query is not a one-off affair. Once the information has been sent out and studied by the recipient, he is often able to be more precise in formulating his question which may originally have been expressed in rather vague terms. The questions therefore become more and more specific.

The possible ways of assisting the applicant to solve his problem may extend to sending out an expert who will try, in collaboration with the applicant, to find a suitable solution to the problem on the spot.

As a result of answering these questions, GATE has got a picture of which institutions in the developing countries are working on which problems. On the basis of this knowledge GATE is also able to refer applicants to institutions in developing countries; in this way it is trying to make a contribution towards strengthening Technical Cooperation among the Developing Countries themselves (TCDC).

Sometimes these activities help GATE to identify information gaps in certain fields. As a result, it may make proposals for possible Research and Development (R & D) projects which are passed on to other GTZ units.

In addition to enquiries from developing countries, GATE also receives many enquiries from the Federal Republic of Germany and other industrial countries. Enquiries from persons or institutions in the field of development assistance are passed on to BINE (Bürgerinformationszentrum Neue Energien = Citizens' Information Centre on New Energies). BINE is one of the offices of the Technical Information Centre in Karlsruhe which was set up at the instigation of the Federal Ministry for Research and Technology for the purpose of answering enquiries of this type with "information packets".

From GATE's Letter Box

"I think your book is an excellent introduction to stoves and I particularly like your ideas on dissemination and the list of possible ways to improve the different stove models."

Dague B. Clark, Peace Corps, Bamako/Mali.

"We were especially impressed by the module Small Scale Irrigation. I asked our most experienced civil engineer to review it. After doing so, he reported that it was excellent! It would be a most useful resource book for both our engineering and agricultural volunteers."

Gerald van Koeverden, CUSO, Bangkok/Thailand.

"Thank you for the excellent Module Small Water Turbine. We are in the process of trying to set up a small manufacturing plant to make water turbines. Our set will essentially be model led on the Nepalese experience."

Rik Hothersall. The Papua New Guinea University of Technology, Lae, Papua New Guinea.

"Since people in my area mainly dependent on wood for fuel and now it is being very scarce we wanted to improve the efficiency on our present stoves. So, I kindly request you to send me a copy of the stove book for improving our firewood burning earthen stoves in order to get greater efficiency from the fuel."

Govind Nettar, Melukanchodu, India.

"Your use of large type in printing the literature is very important. Many of our workers will read your models in the poor light of a kerosene lamp after a hard day's work in the field. Large type also helps those who are not very familiar with English ... Since many field workers are not very familiar with English, it may be necessary to simplify the language of some of the publications... The drawings given are excellent. Many authors of manuals for developing countries think that because their readers are not technically trained, rough sketches without showing all dimensions of devices will do. It is always more difficult to make a device from an undimensioned sketch than from a proper technically-good drawing."

## Subjects and Countries

Since it was set up, GATE has answered about 5000 enquiries (see Table 1). The questions asked extend from: What is GTZ's task? What does GATE do? How do we find funding for . . .? I would like all available information on wind energy . . . Please send me your module on "Fuel-Saving Cookers", to: "To irrigate our fields we have to pump water up from a river. We can only use animal power because electricity is not available and fuel is too expensive. What other options are there?" Table 11 gives an idea of the questions that have been put to GATE and by whom.

In the last few years enquiries have reached GATE from all parts of the world –two thirds of them (66%) from developing countries, 30% from the Federal Republic of Germany and four percent from other industrial countries.

If one looks at the enquiries from the countries of the Third World from the geographical point of view, the picture is as follows (enquiries from developing countries = 100%):

Africa: 29%,  
India, Sri Lanka, Himalayan states:26%,  
Latin America: 23%,  
South-East Asia: 22%.

More enquiries have been received from India than from any other country.

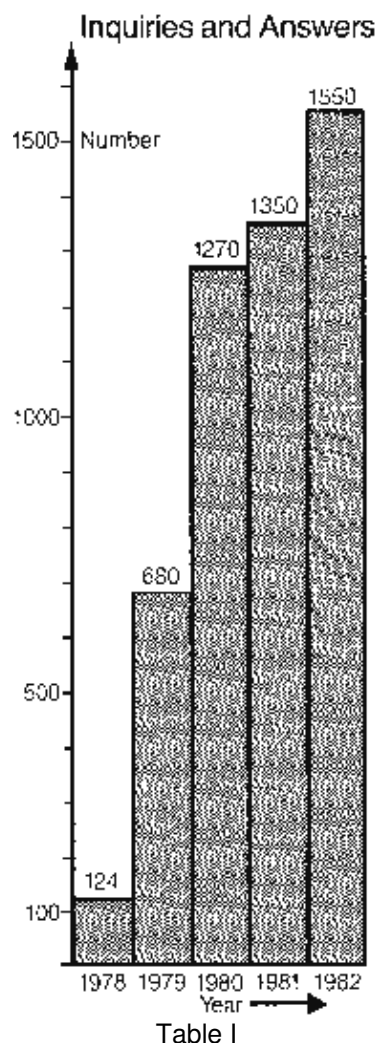
In the course of time, the percentage of questions dealing with organisational matters and procedures has decreased while specifically technological questions are showing a steady increase. The main focus of the questions has shifted from agricultural to the use of renewable sources of energy.

When grouped according to the seven categories of the SATIS classification, the picture is as follows:

1. Man and society (5%),
2. Energy (49%),
3. Water supply (10%),
4. Agriculture, forestry and fisheries (10%),
5. Food production (9%),
6. Industry (6%),
7. Construction (11%).

Recently GATE has been receiving more questions about biogas, oil presses and bullock-gear.

As the number of questions has increased, so too has the demand for precise information on technologies which have already been tried out and found to be efficient as well as simple and economical to maintain and service.



About 5,000 questions were answered by GATE since 1978. Last year, in 1982, some 1,550 enquiries were put to GATE. In average, GATE is receiving about 120 enquiries per month, two thirds of them coming from developing countries. Nearly half of them (49%) are dealing with energy problems.

GATE is therefore becoming increasingly interested in institutions in industrial and developing countries which have developed technical solutions and tried them out in practice. Consequently GATE is planning to step up the implementation of measures to reproduce plant and equipment and test its efficiency and performance.

#### Cooperation with Zimbabwe underway

In the months ahead GATE will start to cooperate for the first time with an institution in Zimbabwe.

This is the result of GATE's participation in the exhibition entitled "Rural Development Technology 1982" (RDT 82) which was held last autumn in Bulawayo, Zimbabwe (see "gate" 1/82, page 33).

During RDT 82, GATE representatives agreed on a cooperation scheme with the University Technology Forum (UTF) of the University of Harare (formerly Salisbury) in the field of rural technology. The scheme will probably consist of support for projects concerned with local soap production, latrine construction in rural areas and bee keeping.

This-cooperation will take place within the scope of the already existing project "Question and Answer Service".

#### **"Wood has a Future in Kenya"**

Towards an Energy Strategy for Developing Countries: Case Study "Fuel Wood Cycle" Kenya by Peter Pluschke.

Since 1973/74 people have been talking about a global energy crisis. What is meant is the oil crisis. But for most of the countries of the Third World, obtaining supplies of fuelwood and charcoal is every bit as problematic. This is known as the "fuelwood crisis". A strategy designed to resolve this energy problem has been drawn up in the last few years in and for Kenya with international, including German, assistance.

As in other countries, data on the energy situation in Kenya was only very sketchy until the end of the seventies. It was estimated that by the year 2000 there would be a discrepancy of between 10 and 12 million tones between the consumption and production of wood.

Apart from the short supplies of fuelwood, these figures conceal other more far-reaching problems: Deforestation, the danger of erosion, disruption of natural water storage, negative repercussions on employment in rural areas etc.

Aware of the deteriorating situation and the crisis ahead, the Kenyan Government decided at the beginning of 1978 to take up suggestions made by the Beijer Institute in Stockholm. It was decided to carry out a long-term study on energy and development problems with special reference to the rural areas.

With the participation of international donors, the Beijer Institute was commissioned to carry out a detailed analysis of supply and demand in the energy sector in association with the Ministry of Energy; the study will enable the formulation of a long-term national energy policy.

The Federal Republic of Germany expressed its readiness to make a substantial contribution towards financing the study (over half a million marks); GATE was responsible for the coordination.

There were three steps:

1. To work out projections on total national energy demand and supply;
2. To identify relevant technical and socio-economic factors, particularly those which influence the supply of and demand for fuelwood;
3. To identify possible political measures to improve the supply of fuelwood and prevent the slow denudation of the country.

More than 60 scientists were involved in the research work, which got underway early in 1980, in local case studies, the evaluation of aerial photographs, the evaluation of statistical material, the collection of data on regional energy consumption etc., as well as close on 600 people in various supportive functions. That is not counting the work carried out behind the scenes by numerous Kenyan authorities.

The findings were made available in 1982. They were discussed at the seminar in May 1982 in Nairobi. They are contained in many individual studies and in a summary entitled "Energy Development in Kenya. Problems and Opportunities".

Dominating Factor:  
Rural Households

The work of the Ministry of Energy (MOE) Kenya and of the Beijer Institute produced a detailed survey of present energy consumption patterns in Kenya. 1980 was established as the base year for all surveys and further investigations. The results are shown in Table I including a survey of the various primary sources of energy with details of conversion losses and exports (which appear as negative consumption in the table); and with a survey of final consumption (broken down by sector with respect to demand from final consumers).

Phil O'Keefe, project co-manager has estimated that the figures have an accuracy of  $\pm 15\%$  which, considering the difficulty of collecting data, can be regarded as very good and a "reasonable basis for strategic planning".

It is particularly important to realise what proportion of energy consumption is accounted for by individual economic sectors or other spheres of life.

This is shown in Table II.

Rural households are the dominating factor in final energy consumption. In fact, more than 74% of energy raw materials currently consumed come from non-commercial sources (especially fuelwood). Current demand for fuelwood is about 18.7 million tonnes annually, though only about 13 million tonnes, corresponding to new

growth, can be taken from Kenyan reserves. Wood and oil together provide about 96% of total energy consumed in Kenya. Future energy policy will be orientated on these basic data.

Under the "Fuelwood Cycle" project, the overall picture of energy consumption in Kenya was improved by detailed studies providing an insight into patterns of consumption both in industry and rural households.

Some of the results of the field report by Jane Jedd Hayes are good examples: "Where the paved road ends: a case study of six households in the Machakos District. Rural energy supply and demand".

The field report gives a comprehensive picture of six local households (two from each of the lower, medium and higher income groups).

Obtaining household fuel is a problem for the women. Wood, charcoal and kerosene (and crop residues on a limited scale) are the fuels used to prepare meals, charcoal and kerosene being used only among the better off families, of course, though even they do not use them all the time, only now and again. Kerosene is also used for lighting purposes. Wood may be collected on one's own land or (with permission) from neighbouring land, and the women do not have to pay anything. Depending on the circumstances between 30 and 120 minutes are spent each wood.

The men also help to obtain fuelwood; on a few days each month they fetch wood on ox-drawn carts, usually freshly cut branches from trees in the surrounding area but, if necessary, whole trees are felled. Some families sell fuelwood in the towns to generate additional income, for example, when the harvest is bad, to enable them to buy food.

For cooking purposes the open three-stone fire is still most commonly used (in all three income groups). There are also the jikos which are mainly fuelled by charcoal. Kerosene is virtually only used to make tea etc. It is too expensive to use for cooking.

Planting trees on their own land to secure fuelwood supplies is, therefore, under these circumstances, an important matter for the people living in the Machakos District. Almost all households have already planted trees; fruit-bearing trees such as papaya, guava, mango and citrus fruits are the favourites. But one nursery in the district had also sold about 15,000 seedlings of types of trees from which fuelwood is often obtained.

#### Energy Development Prospects

The authors of the study expect an annual rate of increase in energy consumption of about 4.7 % in Kenya. The increasing urbanisation of the population is likely to lead to a disproportionately high increase in the consumption of charcoal (6.7% per annum); while growth in the consumption of fuelwood is expected to be disproportionately low (3.6% per annum), the demand for mineral oil is expected to increase by about 3.9% per annum.

Electricity supplies, which play only a minor role in the overall picture of energy consumption, are expected to increase by about 8.5%, according to the study, which would require an increase in generation capacity of about 150 MW in the next ten years, or about 600 MW by the end of the century.

With prospects such as these, Kenya can expect serious problems with supplies of fuelwood from the middle of the eighties onwards. Timber reserves are likely to dwindle by about 20% per annum from 1980 to the year 2000 which could mean a supply gap of about 30.6 million tonnes (about 65% of expected annual demand). The development is clearly set out in Table I

To secure energy requirements in the long term, the study mentions three important factors:

- a) energy for the rural areas,
- b) energy for agricultural development,
- c) energy for general development.

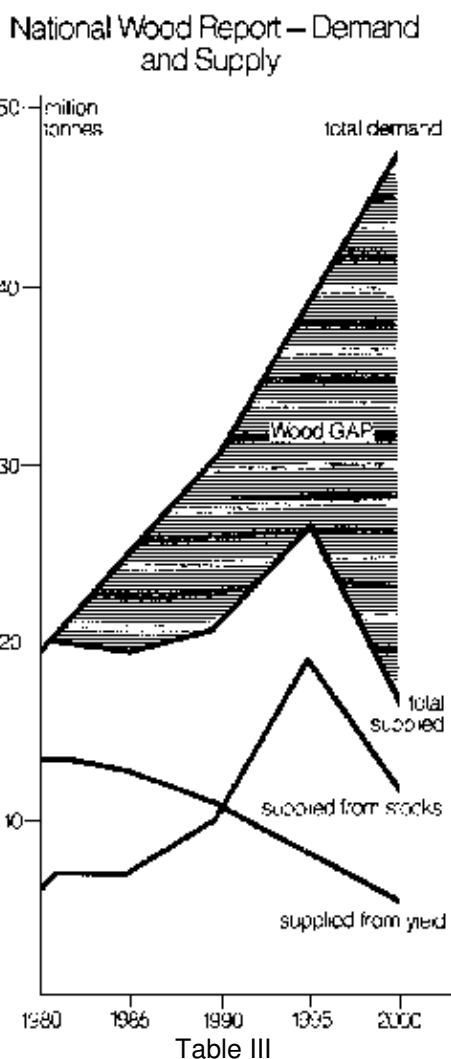
In view of the predominant role of wood as a primary source of energy, proposals for improving and securing timber reserves are particularly detailed.

Two paths are proposed:

1. Enhancing the domestic wood resources base will establish conditions upon which a sustainable energy future, consistent with development objectives, can be built. The wood resource enhancement policies, which have been identified, include:

- a major emphasis on agroforestry,
- periurban plantations, – industrial plantations, – replanted forest,
- enhanced management of natural forest.

2. Parallel to the supply enhancement strategy, attention must be paid to the feasibility of decreasing pressure on wood resources by improving the efficiency of wood stoves, charcoal jikos and charcoal production kilns. All such conservation strategies are difficult to implement, however, not because of technical problems, but because of the impact on everyday production and consumption practices of ordinary people.



It is important to realise that the three–stone fire, used principally in the home, offers a number of advantages compared with the fuel–saving stove: Rapid boiling, lighting, space heating, maintenance of thatch, reducing insect populations, preserving and flavouring food, providing a social focus. Efforts to improve stove design are essentially misguided if the criterion for design is pure physical efficiency rather than social efficiency.

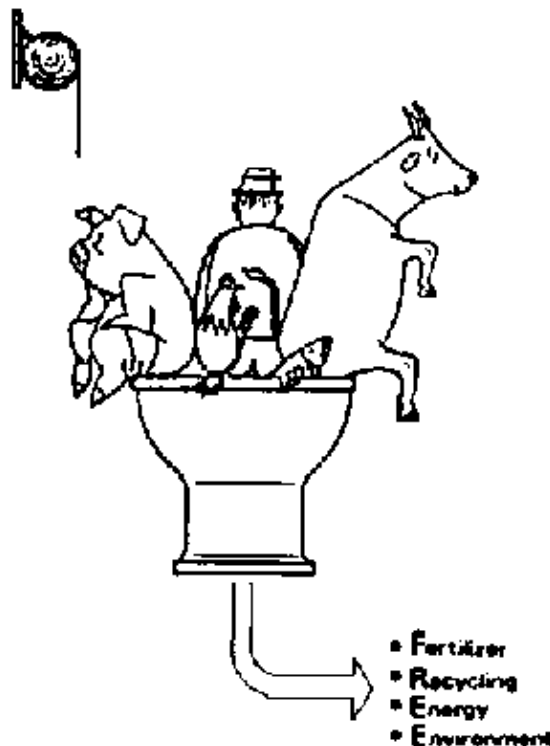
Provided these general considerations are taken into account the spread of fuel–saving stoves should make a significant contribution towards decreasing pressure on the energy supply situation.

The authors of the study conclude that it is possible to close the gap between supply and demand for energy. Wood will have a major role to play.

The outlook may be summarised as follows:

"Wood has long served as the traditional fuel in Kenya and, during the recent phase of Kenya's development, it has been the traditional fuel, especially for urban households. Wood and especially charcoal, is under increasing pressure. However, it is possible not only to avoid crisis but also to build an energy strategy which increasingly relies on wood as a transitional fuel in Kenya. This central strategy, coupled with conservation of the more flexible forms of energy such as liquid fuels and electricity, will encourage development in Kenya by creating a sustainable energy future. This strategy both provides a secure baseline fuel and allows a greater portion of scarce foreign exchange resources to be allocated to the variety of non-fuel commodities required for development. It calls for about 3 million hectares of farmland to come under intensive agro-forestry, 300,000 ha. of natural forest to be replanted, 440,000 ha. of natural forest to be fully managed and 200,000 ha. of land to be converted to peri-urban or industrial plantations.

If these programmatic options are implemented, they will account for at least 35% of the Kenyan energy requirements by 2000 at a cost of 2700 million shillings. By way of contrast, it is worth considering the Keambere Hydroelectric scheme which, by 2000, will be contributing 0,5% of Kenyan energy requirements at a cost of 14300 million shillings. Such comparison highlights not only the contribution of wood to the energy budget but the comparative cheapness of this resource. Wood has a future in Kenya."



Feel FREE – an ironic, ambiguous but very graphic illustration of a subject with serious overtones for development policy. Appeared in the GATE Report on "Wastewater Treatment and Excreta Disposal in Developing Countries", published in December 1982.

### Who can help us?

During an advanced training seminar for members of GTZ on "Appropriate Teaching and Learning Aids" GATE was asked to sound out possibilities of collecting materials for the production of teaching and learning aids as well as for copying.

Therefore, GATE wants to collect information on this subject and requests answers to the following questions:

1. To what extent can materials such as printing ink and offset paper be substituted by materials that are easier to get, are cheaper and can be home-manufactured? Although experts are of the opinion that this might be possible only where simple printing processes with less sensitive machines not controlled electronically are involved (e. g. the letterpress printing process "relief printing" – which still contains some handicraft elements") GATE is asking for suggestions, ideas and advice.
2. Furthermore, de-central and cheap copying facilities are wanted for up to a maximum of 100 copies. These

machines should serve in particular material production "on the Spot" – e. g. at schools, where working sheets to be used in the lessons could be produced. Of importance in this connection would be drawings and detailed descriptions of small and simple handmade devices which would not need first-class paper and printing ink.

Readers who have experience in this field are kindly requested to contact Wolfgang Barina (GATE/GTZ, Post Box 5180, D-6236 Eschborn 1, FRG).

A report on the GTZ seminar on "Appropriate Teaching and Learning Aids" can be obtained from Section 221 of GTZ (address see above); it is available in German.

## **AT for the people's health**

Setting up a Production and Marketing Infrastructure for Medicinal Plants in Guatemala by Eduardo Busquets

An expert from the World Health Organisation (WHO) is supposed to have said: "For 80 percent of people in the developing countries traditional medicine is the only form of medicine they have – only a very small minority is able to benefit from western medicine." This thought prompted GATE to provide support for the Mesoamerican Study Centre on Appropriate Technology (CEMAT – see "Visiting Card", page 25) in Guatemala. The support scheme began in January 1983.

GATE's support which is part of a general cooperation agreement signed by both institutions in 1981 is in the form of a financing contribution to CEMAT for setting up a production and marketing infrastructure. GATE is also prepared to support the project scientifically ("back stopping"); it has also financed a study on export opportunities for medicinal plants and medicinal plant products.

These activities are part of a supraregional GATE project designed to "reactivate indigenous technologies" which currently has a fourpronged focus: Traditional agriculture and agricultural technologies; animal driven gears; traditional medicine; reactivation of traditional water mills, especially in Nepal.

The support is being provided for a CEMAT project which has already been running for a number of years. Since 1976 CEMAT has been carrying out laboratory research with a view to recording systematically all the medicinal plants which are traditionally used in Guatemala. In addition CEMAT is running training programmes on appropriate health technology (Tecnologías Apropriadas para la Salud) for village health officers, concentrating on the "use and cultivation of medicinal plants".

In 1977 a request assistance in setting up an integrated agricultural scheme for medicinal plants (ERPLAM) was presented to the Belgian Financing Group for International Development, "Entraide et Fraternité de Belgique" by CEMAT. It was approved in 1979, and part of the financing was provided by the European Community, EEC (duration of project: three years).

The project was officially launched in April 1980. The Fundación Behrhorst (Chimaltenango) took over the coordination and was to act as a pivot within the produce network of ERPLAM as well as being the location of an ethno-botanical testing laboratory.

The involvement of the Foundation ensured that the medicinal plants were used in an institution which, being a medical unit, regularly treated a certain number of patients as well as implementing other development programmes.

At the end of 1981 the Belgian Development Agency announced that it would discontinue its financial support in the second year of the project; this also meant an end to the cofinancing from the EEC.

Since the farmers working with the project have become very keen to diversify their production and build up ERPLAM, the project should be consolidated so that the medicinal plants can be marketed and the network as a whole properly organised to enable the scheme to stand on its own feet. Under the development policy of the Federal Republic of Germany, GATE therefore took over the promotion of the CEMAT project.

## **Work and Objectives**

Production and Research Centres: Based on three production centres which are integrated in the work of regional health centres, their main tasks consist in: Production, purchase and sale of medicinal plants; running

solar drying units and greenhouses; management of local herb gardens; establishment and management of demonstration gardens and nurseries, and seed production; treatment of patients; training and assistance for rural advisers in the use of alternative therapies and Appropriate Technologies for basic medicine.

Sub-Centres: These have been established near to small agricultural holdings, adviser groups or medicinal plant growers, and operate in the following areas: Production, purchase and sale of medicinal plants; management of solar drying units, in some cases greenhouse management; management of local herb gardens and establishment of demonstration gardens; dissemination of plants; distribution of seed; the science of medicinal plants (advisory and public relations work) for groups living in the vicinity of the village community. In the first two years of the project, contact was established with 21 sub-centres.

Ethno-Botanical Testing Laboratory: It operates in conjunction with a big-degradation laboratory of the Behrhorst Foundation and serves as a central information, research and testing office. The results of the research work are evaluated and used for thesis work and for scientific exchanges with other institutes of basic medicine.

Central Store and Distribution Network: The ERPLAM central store was set up to hold the surplus production of the regional centres and subcentres. It is at the centre of the Behrhorst Foundation which supplies the packaged products to the distribution network. At the end of 1981, the store contained 123.3 kg of medicinal plants of 27 different varieties. So far distribution has been carried out by supplying naturopathic clinics (clínicas naturistas), markets and traditional sellers. Other possible ways of distributing the plants inside the country and of exporting them are being studied.

Demonstration Gardens, Greenhouses, Herb Gardens, Seed Production: In all the centres and sub-centres herb gardens have been laid out where account has been taken of the results of the ethnological questionnaires of CEMAT staff and the experience of the people living there. At the present time some 200 medicinal plants have been classified in the herb gardens. In the greenhouses, demonstration gardens and during seed production, it has been possible so far to acclimatise 100 botanical species; 6 of them have already entered the production and marketing phase.

#### Bookbox: Health for All

"Health for All" is accepted as a basic need which, according to the WHO programme, should be satisfied in all countries by the year 2000. The proclamation of this goal raised considerable expectations in the population of many poor countries. Considering the limited resources available, Primary Health Care is generally recommended as the appropriate solution. The necessity of a referral system, however, is recognised as an essential part of all health planning.

But there is a great variety of strategies to achieve "Health for All", caused mainly by different definitions of "health". Correspondingly one can find a multiplicity of approaches in theoretical discussions, but only very few feasibility studies have been conducted so far, considering the economy, the management and the acceptance of these programmes.

The present case study from Upper Volta gives an estimate of the cost of a HfA' 2000 programme. The estimated costs are based on practical experiences in the implementation of a rural basic health programme in the South of the country. The development of the plan at the highest level was undertaken on a very limited information base, and in consequence the value of the plan is also limited. In order to understand the extremely low health status of the population, one has to consider the economic and social situation and health related sectors like agriculture, water supply and education. The traditional health sector is the main provider of medical care and must, therefore, be included in any health planning, which has its main emphasis on Primary Health Care.

The financial requirements are divided into capital and running costs and assume the foreign financing of a investments. It is shown that the operational costs of the programme would be far beyond the available national resources and expected growth rate in national income. Possible means of overcoming the financial barrier are discussed, and the necessity of intersectoral planning is stressed in order to avoid disproportionate preference to health-related basic need sectors. An overwhelming foreign dependence would be the most serious political impact.

Therefore, the feasibility of the envisaged global programme is questionable.

Priorities and appropriate solutions for basic need programmes must be identified with the target group, e. g. at the provincial level considering local needs and attitudes the role of traditional medicine and

the, available resources. Some example based on positive experience are presented.

"The Cost of Health for A/I -, Feasibility Study from Upper Volta' by Dr. Alfred Merkle, 1982. 101 pages English. ISBN 3-88085-145-X. DM 20,—. GTZ publication No. 136. Available from: TZ-Verlagsgesellschaft Bruchwiesenweg 19, D-610 Rossdorf, FRG.

## **GATE Publications**

The following list provides an up-to-date survey (January 1983) on GATE publications available. They have been produced in different languages (abbreviations: e = English; g = German; f = French; s = Spanish). All publications can be obtained free of charge from: GATE/GTZ, Post 80x 5180, D-6236 Eschborn 1, FRO.

We request you when asking for a publication to give your address and the identification number of the publication.

### **ENERGY**

1/1: Survey of Solar Cookers.

Prepared by Christian Seuferet. 1979. 61 pp (e).

1/2: Survey of Solar Distillation/ Desalination. Devices for small quantities. Prepared by Christian Seufert. 1978. 55 pp. (e)

1/3: Survey of solar water heaters. Prepared by Christian Seufert. 1978. 51 pp (e)

1/4: Solar water pumps.

Technical potentialities, international R & D activities. Prepared by Stephan Dutting and Christian Seufert. 1978. 52 pp. (e)

1/5: Survey of solar powered refrigerators.

Prepared by Stephan Dutting. 1978. 52 pp. (e)

1/6: Survey of biogas plants.

Prepared by Christian Seufert. 1978. 58 pp. (e)

1/22: Biogas plants building instructions.

Prepared by BORDA. 1980. 64 pp (e/g/f/s).

1/7: Helping people in poor countries develop fuel-saving cookstoves.

Prepared by APROVECHO. 1980. 148 pp (e).

S-4: The utilization of renewable energy resources.

A programme of the Federal Republic of Germany for the Third World. Analysis of the planning phase of the Special Energy Programme (SEP). Prepared by C.-P. Zeiting, O. Zieroth, E. Biermann. 1982. 78 pp (e/g).

S-3: Biogas in the Peoples Republic of China.

Summary of the project report. Exchange of experiences in the field of biogas among the PR China, India and the FRG. Prepared by BORDA. 1981. (e/f).

### **WATER AND SANITATION**

1/13: Small water turbine.

Instruction manual for the construction of a cross flow turbine. Prepared by Helmut Scheurer, Reinold Metzler, Sob Yoder 1980. 57 pp, 50 drawings (e).

1/12: Survey of small hydropower plants.

Prepared by Stephan Dutting. 1978. 20 pp (e).

S-5: Wastewater treatment and excreta disposal in developing countries.

Report on a research project on behalf of GATE. By Hans-Jürgen Karpe, Werner Baumann INFU, Dortmund) 1980. 167 pp, 97 fig., 100 re. (e).

2/3: Drawings of hydraulic ram.  
Prepared by DSE. 1979. 42 pp (e/g).

6/2: Sanitary latrines for rural areas.  
Prepared by Christian Seufert. 1977. 52 pp (e).

#### AGRICULTURE AND FOOD PROCESSING

3/6: Small-scale irrigation.  
Prepared by Albert Breuer and Axel Netzband. 1980. 97 pp (e/g).

4/1: Devices for food drying.  
State of technology report on intermediate solutions for rural application. Prepared by Arbeitsgemeinschaft für Entwicklungsplanung (AE). 1979. 83 pp (e/f/s).

3/4: Drawings of 3-row rice drill.  
Designed and built by CENEEMA, Cameroon. 1979. 29 pp (e/g/s).  
Prepared by Herwing Michel-Kim and Klaus Schwerdtfeger 1980. 49 pp (e).

3/5: Drawings of hand-maizer  
Prepared by Hans Hecht/CENEEMA. 1979. 10 pp (e/g).

S-1: Manual on improved farm & village level grain storage methods. Prepared by David Dichter. 1978. 243 pp (e/f).

#### CONSTRUCTION

6/1: Introduction to bamboo as a building material.  
Prepared by Chr. Riechert. 1980. 54 pp (e)

S-2: Minimum cost housing construction in El Salvador.  
Prepared by Klaus Grasser and Kiran Mukerji 1981. 50 pp (g/e/s).

6/12: Instructions for building and using an earth and loam-block-press. Prepared by Hans Hecht 1979. 48 pp (e/g/f).

S-6: Roof constructions for housing in developing countries.  
Report on behalf of GATE on a research study in Central America. Authors: Kiran Mukerji, Justin H. Whipple, Rodolfo Castillo Escobar. 1982. 165 pp (g/e).

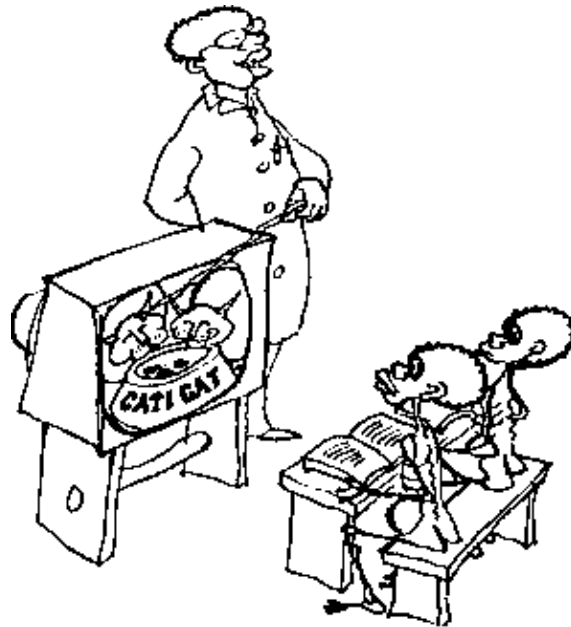
6/6: Low cost/self help housing.  
Foundation. Statics. Protection. Wall construction using pise de terre. Roof construction. Prepared by Klaus Vorhauer. 1980. 152 pp (e. Part 1 -3 also in g and s).

S-7; Lehmarchitektur.  
Rückblick-Ausblick. (Mud Architecture) 1988. 64 pp (e)

#### TRANSPORTATION

4/5 Low cost transportation.  
Prepared by Gert Thoma. 1979. 63 pp (e).

### **Cartoon & reflection**



School Television in the Third World: ". . . and here you can see how far the white people were able to go with much diligence and hard work ". Drawing: Hans Sigg

"Global 2000" begins with "Local 2000"

Last year in a village in northern Germany, near the town of Segeburg, the children had to be given bottled water because the nitrate content of the ground water was found to be too high. Agriculture was at fault.

It is futile to talk spine-chillingly about "Global 2000" and reflect on the salvation of the earth while glossing over the real problems.

I would like to put the following questions: What impact does global information have on our democracy? How does society react to a future of seemingly barred doors? Are we, as a democratic society, still capable of political action in the face of such data of doom and apocalyptic warnings? What sort of policy can there be when objective limits on development are discernible, yet no ways or means to cope with the perception of those objective limits democratically and in freedom?

In theory there are many ways of answering the question.

For a start, you can simply ignore the information. Many people in this country have been doing so for years.

Secondly, you can resign or opt out.

Thirdly – a very dangerous attitude – you can try in anger and fear to force the guilty contemporary age to make an abrupt change of course. The proponents of the latter are under the illusion that there is a global rudder, a lever to change course, in the same place as the global data are to be found.

There is no such thing. That is the point. That is why we–fourthly–must argue about the right courses of action in the spirit of "Local 2000".

"Local 2000" is our only chance of counteracting global trends. We have no patent cures. We do have new, previously unknown problems, and we are ready to listen to anyone with ideas on possible solutions: Future of work, ecologically sound economic cycle, redistribution of dwindling work, detoxification of industrial production, more economic use of water, revision of the old water laws in urban areas, soil protection, detoxification of food, preservation of human forms of communication before they are irreparably destroyed by artificial electronic means of communication.

Today we are struggling for new concepts which arise from challenges such as "Global 2000". One day they will be anchored in the very foundations of our Republic in the framework of democratic freedoms: Worker participation and a balanced economic cycle, energy saving, environmental protection, water protection, ensuring that ordinary people still have a say.

## **International scene**

### **Great hopes with regard to producer gas technology**

First International Conference in Sri Lanka/Revival of an Ancient Technology?

by Hans–Stefan Peterlowitz.

Supported by Sweden, the Netherlands and the Federal Republic of Germany, the "First International Producer Gas Conference" took place in Sri Lanka at the end of last year, together with a "Producer Gas Course". Mention should be made of one major result, namely that participants from the developing countries placed high hopes – though with certain reservations and question marks – in a revival of this technology the use of which was wide–spread in many industrial countries some decades ago.

The Conference as well as the Course had been prepared and organised by the "Beijer Institute of Sweden" and the "Marga Institute" (Sri Lanka Centre for Development Studies). The objective was to provide an opportunity to scientists, engineers and planning experts working with development or implementation of the producer gas technology to exchange their latest experience and to discuss needs for further development of the technology.

For this purpose, a practical introduction to the producer gas technology was organised from 1 to 5 November 1982 at the University of Paradeniya in Kandy; this was followed by the Conference itself at a hotel in Mount Lavinia from 8 to 12 November 1982.

15 engineers and scientists took part in the practical introduction (originally, a number of between eight and ten had been envisaged). With 65 persons attending the Conference, the figure originally expected of persons interested was more than doubled. This great interest manifested by experts and other people mainly from the developing countries indicates the significance attributed to the producer gas technology in connection with renewable sources of energy.

During seven technical sessions and five workshops, the participants from more than 20 countries in Asia, Europe, Africa and America were presented with a great number of "papers", some of them of outstanding quality. The limited number of participants was a guarantee for the discussions on the contributions being very extensive and thorough.

The lively participation, the positive echo and the high standard of the Conference brought the sponsors to the unanimous decision to hold a second International Producer Gas Conference in due time – in about two to three years.

Of course, not all of the participants in the Sri Lanka Conference agreed on all points; this was impossible in view of the composition of participants (scientists from industrial and developing countries, producers from Europe and developing countries, users, development aid volunteers, potential users); however, on the basis of common findings it was possible to workout targets and objectives for the further work. They can be summed up as follows:

1. The developing countries place high hopes in the producer gas technology; they expect thorough changes in their countries' primary energy sector.
2. It is desired to substitute petroleum to a greater extent by falling back on the producer gas technology.
3. The most important fields to use producer gas generators are small and medium–sized combustion motors which are available in great numbers (between 5 and 10 KW); they can be used for irrigation, transport by road, as ship motors, for the generation of energy on islands, for grain mills, and for small–scale industries.
4. Carburettors would have to be constructed in such a way that they could be manufactured in the developing countries themselves; this would have the side effect of reviving trades and small–scale industries.
5. A quick and comprehensive dissemination of this technology is still hampered by the fact that its

6. Information from the industrial to the developing countries on the producer gas technology of the 1930s and 1940s as well as its modern form is totally inadequate. The developing countries expect the industrial countries to provide scientific advance contributions and the respective technical information.

7. Development has not yet matured sufficiently (the installations offered by the industrial countries at prices between DM 1,000 and 2,000 per installed KW are practically unsaleable in the developing countries).

The solution to adapt traditional types of carburettors to different fuels (crop residues) does not seem to be really practicable; based on the properties of fuels, one should rather try to develop a suitable type of carburettor for certain groups of fuels. The search for a universally applicable type of carburettor suited for all types of fuel seems to hold little prospect of success.

8. The use of the gasification process in a fluidized bed gas producer in the developing countries today seems of little help in view of the size of the gasifier and the auxiliaries, the complexity of its system and the problems connected with control and regulation.

9. Processes which really have stood the test and have proven useful are the gasification of wood, charcoal, and certain types of coal, where fuel properties are clearly delineated.

10. The gasification of agricultural waste material, highly desirable, has so far been tested only in isolated cases and is not yet ready for mass application. As long as gasification of biomass waste is not sufficiently advanced, the danger is there of users falling back on wood and charcoal, thus further aggravating the already critical situation.

11. Just like other sources of renewable energy, the producer gas technology can guarantee a proper supply of energy only in conjunction with such sources, without in turn producing harmful effects, e. g. ecological damage.

Course and Conference were sponsored by

- the Swedish International Development Authority (SIDA/Sweden),
- the Ministerie der Buitenlandse Zaken (MBZ/Netherlands), and
- GATE/GTZ (Federal Republic of Germany).

GATE's financial contribution amounted to some ten thousand DM. In its function as sponsor, GATE took part, more over, in the "Producer Gas Round Table" in Sri Lanka. This loose association of donor institutions working in the producer gas sector held a meeting in Colombo in order to harmonise the further work on the Conference proceedings and to carry out a first evaluation of Conference and Course.

## **RE–Centre in West Africa**

Works on "CRES" have begun in Bamako Secondment also of German experts by Dipl.–Ing. Friedrich von Bismarck, GTZ

By setting up a "Bureau d'Etude et des Réalisation" in Bamako, the capital of the West African state Mali, nine countries in this region have taken a first step towards establishing a regional centre to test new processes of using Regenerative Energy (RE) sources and to train expert staff. This loins project of several African countries is supported, among others, by the German Federal Government; it has commissioned GATE (GTZ) with implementing the respective activities.

The establishment of this centre, called CRES (Centre Regional d'Energie Solaire), is based on a decision taken by the heads of state of the Economic Community of West African States (ECOWAS) in October 1978. Some member countries of ECOWAS as well as some of the community of Sahelian countries (CPILSS = Comite Permanent Interetats de Lutte contre la Secheresse dans le Sahel) took up this decision.

The following nine countries are CRES countries: Cape Verde, Chad, Gambia, Ivory Coast, Mali, Mauretania, Niger, Senegal and Upper Volta.

The energy situation in the nine CRES member states can be briefly described as follows:

- The consumption of "modern" energy (oil products and electricity) is extremely low; it is confined to a small part of the population living mainly in the cities. The bulk of this "modern" energy has to be imported. Despite the low consumption, costs of importation have risen sharply and faster than export income;
- the consumption of "traditional" energy in the form of wood is still fairly predominant. The quick increase in population in most of these countries entails rising difficulties in the supply of fuelwood and a fast-growing deforestation.

If this development is not counteracted, these countries will soon be confronted with a two-fold energy crisis: An energy crisis which, as a result of an intolerable burden of energy importation, will result in a throttling of economic growth; and an energy crisis which, with its growing deforestation in the whole Sahelian belt, will lead to a large-scale disruption in the ecological balance.

This trend can be checked only by means of a specific action to introduce RE sources in conjunction with other accompanying measures (e. g. saving of energy). For these reasons the CRES member countries decided to set up this Centre which receives support from several industrial countries and international organizations.

The major tasks of CRES in Bamako will be to train experts, to test new technical processes in the field of renewable sources of energy and to adapt them to conditions in the region.

At the same time, the Centre will support existing national activities to introduce RE and help in the establishment of national centres. It will furthermore provide advisory services to national governments in working out government programmes and assist them by means of preparing the respective studies.

Another separate unit will be established under CRES' roof which will be given the specific task of promoting the production of the various devices to produce Regenerative Energy.

A definite decision was taken, however, in December 1982, to set up CRES in Bamako. Firm commitments were made at a donor conference in Brussels concerning the building and all pertinent equipment. The group of international donors consists of OPEC members, the African Development Bank, the United Nations Development Programme (UNDP), the European Development Fund, and the Governments of France and the Federal Republic of Germany.

France and the FRG have seconded a number of experts of the "Bureau d'Etude et des Réalisation" which has already been set up as forerunner to CRES in Bamako. First training measures as well as advisory activities to support the national member countries are already under way.

Growing interest in SATIS membership

Interest of organisations and groups in becoming a member of the SATIS network (Socially Appropriate Technology International Information Service) rose tremendously during the past year.

According to SATIS Secretary Paul Osborne some 50 organisations and groups working in the field of Appropriate Technology have put forward a request for membership since the foundation of the network in April 1982 (cf. "gate" 1/82). At present, SATIS has 22 members of which the majority are working in countries of Africa, Asia and Latin America.

The next general meeting of SATIS is planned to take place in 1984 in India. Osborne expects that more than 70 member organisations will then take part in the meeting.

## Visiting card

### CEMAT

CENTRO DE ESTUDIOS MESOAMERICANO  
SOBRE TECNOLOGIA APROPIADA  
18 CALLE 22-52 ZONA 10

TELEFONO 681007  
APARTADO POSTAL 1160  
GUATEMALA, GUATEMALA, C.A.

Address:

Centro Mesoamericano de Estudios  
sobre Tecnología Apropiada  
(CEMAT)  
8a Calle 6-06  
Apartado Postal 1160  
Ciudad de Guatemala  
Guatemala C. A.

The Mesoamerican Study Center on Appropriate Technology (CEMAT = Centro Mesoamericano de Estudios sobre Tecnología Apropiada) is a non-governmental non-profit institution in Guatemala founded by national scientists as an answer to the need generated after the 1978 earthquake which has devastated ample zones in Guatemala (Caceres & Anturias 1978).

After six years of work, there has been ample participation in experimentation, evaluation and diffusion of different Appropriate Technologies that are offered as alternatives for rural development. The experiences in these technologies comprise: Different ways of using bioenergetic systems (biogas, bio-fertilizers, solar energy, resource conservation), production of alternative construction materials, technologies for environmental quality improvement (wood saving stoves, dry family composting latrines, afforestation), nutritional and medicinal alternatives (aquaculture, medicinal plants and acupuncture, recuperation of forgotten foods) and improvement of agricultural production.

At the same time, a follow-up and group attendance methodology has been developed for campesinos organized about these technologies who directly promote development.

The international actions have included advisory and construction of biogas digesters and other Appropriate Technologies in several countries of the Mesoamerican region; organizations and participation in courses, conferences and international seminars; coordination and relation with several national and international networks for the information exchange on Appropriate Technology; and quarterly publication of the RED NEWSLETTER that is published in Spanish, English and French.

The rapid acceptance of these technological options by the rural people, the interest demonstrated by governmental and international organisms and the development of international networks on Appropriate Technology indicate that these will be disseminated in the future for the benefit of large popular sectors, especially those related with bioenergetic systems.

Recently, CEMAT is studying the possibility of using solid wastes in several urban settlements in Guatemala City. This offers a new panorama with respect to garbage recycling, and is a challenge to contribute in the solution of this problem that has been a headache for a long time in many cities.

On the other hand, varied experiences on Appropriate Technology for ecodevelopment have been pursued such as: Soil and rain water conservation; fish culture using effluents from biogas digesters; ample utilization of alternative construction materials; experimentation with low cost water pumps; and appropriate forestal techniques and species for short-term afforestation.

After an experimentation phase of more than six years, CEMAT has now entered a new stage of massive diffusion. To reach the goals hoped for in this new stage, it will be necessary to include the strategies for ecodevelopment. From the point of view of the rural energetic situation, CEMAT proposes some strategies which could improve the crisis or at least lengthen the time before an irreversible critical situation is reached.

For an example for the cooperation between CEMAT and GATE: See "Workshop".

## **CORT**

CONSORTIUM ON RURAL TECHNOLOGY

Address:  
Consortium in Rural Technology (CORT)  
A-89 Madhuran  
New Delhi -110 092  
India

The "Consortium on Rural Technology" (CORT) is a non-profit organisation, working for amelioration of the rural poor in India. For its programmes it raises funds by membership of the Consortium, donations from both national and international donors, interested in the development of Rural Technology, and from other quarters interested in that field.

The objectives of CORT are mainly to help the efforts of the nongovernmental groups or individuals engaged in Rural and Appropriate Technology (AT) programmes. The role as such, being supportive and catalytic in relation to each of its functions, is to encourage and to keep in touch with other institutions, national and international, to redirect their efforts effectively towards AT.

The intention of CORT is to take rarely an exclusive role in any project while it might initiate action. It is always trying to involve others at an early stage, and aims to pass the responsibility to other institutions or individuals as soon as possible.

In playing this supportive and catalytic role, the various functions of CORT are:

1. Helping in the identification of priority areas for the Rural Technology work;
2. Identifying institutions and groups which require critical support for this successful development and dissemination;
3. Provide suitable assistance by way of information, training, experts etc. to these institutions;
4. Assisting the passage from research to the development phase in the generation of AT;
5. Strengthen the AT delivery system by facilitating direct contacts between the producers and users of AT;
6. Contributing to the generation of an atmosphere in which the prestige of AT is enhanced;
7. Facilitating the exchange of experience among AT institutions/ groups;
8. Disseminating AT success stories as well as an insight into the causes of failures;
9. Reviewing developments in the field of AT including socioeconomic aspects;
10. Studying ways in which private efforts on generation and transfer of technology might be made more appropriate both with respect to technology, developed by the advanced countries and with respect to technology, developed by local firms, etc.

Among the priorities that CORT has fixed for itself is, inter alia, the development of an Information & Dissemination Centre. CORT is collecting different studies that have been published in India on different alternative Appropriate Technologies. It has also established contacts with AT organisations and groups abroad, e. g. with Volunteers in Technical Assistance (VITA) in the USA, the Intermediate Development Technology Group in Great Britain, SKAT in Switzerland, TOOL in the Netherlands and GATE in the FRG.

## **Documentation**

Programme of the Federal Government concerning Cooperation with Developing Countries in the Field of Energy

At the beginning of December 1982, the Federal Government published, for the first time, a document comprising ten chapters on a "Programme concerning Cooperation with Developing Countries in the Field of Energy". The purpose of this document is to present development aid targets, guidelines and measures of the Federal Republic of Germany designed to contribute towards solving the energy problems of the Third World. In addition to detailed analyses and stocktaking of energy cooperation to date, the programme contains a few tangible starting points for an enhanced cooperation as well as a plan of action.

## Energy, a focal point in economic cooperation with Developing Countries

Availability of energy is a fundamental prerequisite for the development process. As a result of the twofold sharp leap in oil prices, the situation of the developing countries, already difficult enough in general terms, has reached a new dimension. However, these countries are in a critical phase not only in terms of commercial energy sources; even traditional sources of energy become scarcer in many countries (fuelwood, charcoal, plant and animal waste etc.). Thus, the developing countries are affected not only in their modern industrial and urban sector, but just as much in rural and peripheral areas.

The Policy Paper on Development Cooperation of 9 June 1980 by the Federal Government expresses clearly that the priority goal of checking absolute poverty in the developing countries is a crucial factor in determining the technical lay-out of projects and programmes and their contents.

Under German development policy, particularly high priority is attached to some particular sectors. The share of three of them in total bilateral cooperation will be raised, namely that of rural development, energy, and the protection of natural resources.

The Federal Government holds the view that efforts to concentrate development cooperation on high priority sectors such as energy gains even further in importances in times when official budgets are overstretched.

The energy programme concludes with a brief Plan of Action; it has the following wording:

- coordinated use of (bilateral) instruments and measures The Federal Government
- increases the share of the energy sector in bilateral technical and economic cooperation as stipulated in the Policy Paper on Development Cooperation;
- takes into account, in its national research and technology policy, its scientific-technological and its technical cooperation, the need for research and development in the field of energy technologies which are of relevance to developing countries, and promotes their transfer and dissemination;
- carries out a sectoral special programme to provide training and further training to nationals from developing countries in the field of energy; in this connection, the present emphasis on electricity will be supplemented by activities in the field of fossil energies and renewable sources of energy which have already been tested in the developing countries;
- continues its special energy programme for developing countries while placing particular emphasis on the dissemination of technically mature technologies and the strengthening of institution and project-executing agencies;
- intensifies cooperation with the non-governmental sector with the objective of inducing this sector also to increase its activities in the field of energy;  
adjusts accordingly the sector-related and target-oriented criteria for deciding on the appraisal of projects and programmes with regard to their eligibility;  
intensifies its forestry programme especially by implementing measures of afforestation and preservation of forests;
- reviews the energy component of all development cooperation projects as to its compatibility with the programme;
- endeavours to intensify development cooperation in the field of energy with the poorer and the poorest oil-importing developing countries.

### Multilateral efforts

#### The Federal Government

- Supports measures in those areas which have been declared priority sectors in the Nairobi Plan of Action;
- works towards strengthening the activities of the World Bank in the energy field (together with industrial and oil-exporting developing countries willing to participate);
- works towards high priority being attached by the European Community to energy projects worldwide;

– sees to it that projects designed to provide energy in rural areas (especially afforestation for production of fuelwood) are supported within the scope of WFP projects;

– supports UNIDO by means of funds-in-trust in its efforts to use alternative energies in small and medium-sized industries in the developing countries.

The "Programme of the Federal Foreign Government concerning Cooperation with Developing Countries in the Field of Energy", edited in German, is available (free of charge) as No. 70 of the "Materialien des BMZ" at: Federal Ministry for Economic Cooperation (BMZ), Karl-Marx-Strasse 4-6, D-5300 Bonn 1, FRG.

## News from Bonn

Energy Hearing  
Promotion of Crafts  
EEC Biomass

Gaps in Energy Support

Hearing of the Bonn Parliament on "Energy Problems of the Third World and Development Policy"

Exactly 448 pages was the number of written documents presented to the members of the Parliamentary Committee on Economic Cooperation before the start of the Hearing on 8 December (it had been postponed by one month because of the Government reshuffle) on "Energy Problems of the Third World and Development Policy" (cf. "gate" 1182). Representatives of eleven German organisations and institutions which devote part of their activities to development cooperations were present to answer questions by the MP's.

One thing was already summed up before the event took place by the Head of the Committee, Uwe Holtz, on the basis of statements in writing by the experts: "It appears that a parallel approach is shaping up. The industrial countries should further cut down on their energy demand. The developing countries should attempt to solve the problem in a comprehensive approach which, on the one hand, provides for the use of all available energies within the frame of a principally decentralised supply system whereas, on the other hand, the greatest emphasis must be put on using local resources and on afforestation measures. The industrial countries ought to support such efforts vigorously, especially by means of imparting know-how and, skills".

GTZ Statement

Based on its experience with projects in the field of energy, GTZ explained in the Hearing that "a mere imitation of the industrial countries' energy supply system in the developing countries is neither feasible nor desirable". Objectives should rather be geared to such areas which take account of the specific situation of each individual country:

**Saving of Energy:** This should assume first rank in all considerations as this was the quickest way to mobilise "additional" sources. The same holds true for plans and actions which should be geared to just such requirements;

**Using Local Resources:** In this field, efforts should be directed at carrying out the following measures: Safeguarding the supply of fuelwood while at the same time stabilising the ecological balance (checking a further cutting-down of wood, desertification, the further development of steppe, loss of land, and disturbances in the water balance); promoting animal draft power and organic pumping energy as well as continuing to replace mineral fertilisers by resorting to such cultivation which is adapted to existing conditions and which at the same time serves to supply energy to the agricultural sector; decentralisation of energy supply systems so as to secure satisfying basic needs of the poorer strata of people by means of providing, locally, suitable energy (in some countries, fuelwood has become more expensive than food inside the cookingpot).

The solution of the energy problem – the statement of GTZ goes on to say – cannot lie in an "either-or" but only in a well-balanced system of using energy, which is optimally adapted to the respective local economic and ecological conditions. Priority should be given in this connection to a de-centralised rural energy supply system.

In its statement, GTZ refers to two problems in connection with the introduction of new/alternative technologies:

1. Despite some isolated regional success it must be stated that the degree of technical maturity reached so far with most systems of regenerative sources of energy is as yet not sufficient to mitigate on a grand scale the existing supply problems in the short run;

2. Substantial problems arise as regards the introduction of such technologies, for quite frequently new technologies or technical solutions entail changes in traditions which in turn have a considerable ecological and socio-cultural impact.

With these findings GTZ was in accord with many other organisations. The representatives of the Churches suggested in the Hearing that more time should be devoted to the investigation of not only economic, but also political, social and cultural consequences of energy measures, and to assist the developing countries in any such activities. Energy policy, they say, must not be seen in isolation, but within a larger general context.

#### Field Tests and Marketing?

Several other organisations pointed out to the members of Parliament that there was a gap in the development cooperation measures to help the developing countries. Up to now, the development of prototypes was assisted up to the so-called laboratory phase on the one hand, and the production and dissemination on the other. In contrast to this policy, the practical testing of newly developed or improved products "in the field" was not given any official assistance; moreover, no market tests were carried out (economic rentability, marketing, studies on social acceptance, or technical testing with a view to operation and maintenance).

The proposal to give official support also to these two sectors might be reworded into a recommendation for the Parliamentary Committee concerned. Its Head, Uwe Holtz, announced that his Committee would study all statements made by the experts and would then draw conclusions for the development policy of the Federal Government. This would still take some time as first of all a new Parliament will be elected in the Federal Republic of Germany (on 6 March, 1983). The competent Federal Ministry for Economic Cooperation has already declared that it intends to raise development aid funds for energy projects in the countries of the Third World (cf. "Documentation").

Committee members Winfried Pinger and Heinz Günther Hüscher, both of the Christian Democratic Union (CDU), expressed themselves similarly. They said in a press release after the Hearing: "Our development policy shows some gaps in the field of energy. For example, the translation of research and development results into competitive products is inadequate. The application of important technologies is delayed because there is no smooth and rapid transition from prototype plants to mass production." They stated furthermore: "Social consequences have not yet been investigated sufficiently."

#### Participants

Apart from GTZ, representatives of the following ten organisations and institutions were invited to the Bonn Hearing:

Working Group of Large-Scale Research Institutions, Working Group of German Scientific and Economic Research Institutions, Working Group on Developing Countries, Federal Agency for Geo-Science and Raw Materials, Federal Association of Solar Energy, The German Atomforum, Association of German Trade Unions, the Joint Conference of Churches and Development, Kreditanstalt für Wiederaufbau, Association of Independent Advisory Engineering Companies.

Detailed information and documents (in German) on the Hearing can be obtained from: Ausschuss für wirtschaftliche Zusammenarbeit des Deutschen Bundestages, Bundeshaus, D-5300 Bonn 1, FRG.

#### Less Money for Energy Research

In 1983, funds for research into energy (except nuclear energy) have been cut by the Federal Ministry for Research and Technology by about 50 million marks.

A total of 613.5 million marks is now available for these purposes, consisting of 374 million marks for coal and oil (heavy oil hydrogenation) and 239.5 million marks for projects on the rational use of energy and for research into renewable sources of energy.

The new Federal Minister for Research and Technology, Heinz Riesenhuber, gave an assurance that all project already begun would be continued.

A new Programme:  
Promotion of Crafts and Small Trades

The Bonn Government has introduced a new item – for the promotion of crafts and artisan and small trades – into the budget of the ministry responsible for cooperation with the developing countries, the Federal Ministry for Economic Cooperation.

The heading of the new budgetary item is: "Promotion of important crafts and artisan projects in developing countries by private German sponsors". A total of nine million marks has been allocated for the 1983 budgetary year, made up of five million cash allocation and four million commitment authorisation.

Support for NGO's

The money will be used to support projects of non-governmental organisations which, in turn, are promoting craft and artisan projects of their cooperation partners in countries of the Third World.

This new allocation is the forerunner of a comprehensive scheme to promote crafts and artisan and small trades in developing countries which is currently being worked out in the Bonn Development Ministry. The scheme is to cover all the instruments of existing bilateral development assistance.

"Backbones"

Explaining the thinking behind the new scheme, the Parliamentary State Secretary in the Federal Ministry for Economic Cooperation, Volkmar Kohler (CDU), expressed the view that, in the Third World too, arts and crafts and small trades "were essential as the backbone of any organic economic and social development".

Support for artisan and craft trades was a way of creating a large number of jobs at relatively low cost. "A healthy artisan base", Kohler continued, "can, in the Third World too, help to foster the growth of private enterprise geared to demand, and forms of community production at the same time".

Private or independent organisations in developing countries who would like to receive support from the new funds made available in the BMZ budget should be engaged in a cooperation scheme with a non-governmental development aid organisation (NGO) in the Federal Republic of Germany. Only a German NGO may apply to the BMZ (Section 324) for support provided it is itself making a contribution to the project.

EEC 2000 – five percent of energy from biomass?

By the year 2000 some five percent of the primary energy requirements of the European Economic Community (EEC) could be obtained from biomass.

This was the claim made by Georg Gallus, Parliamentary State Secretary in the Federal Ministry for Food, Agriculture and Forestry, at question time in the German Bundestag at the end of October 1982 in reply to a question from Ralph Herberholz MP, SPD.

Here are question and answer in full:

Question: What new insights has the German Federal Government gained from attending the Conference on "Energy from Biomass" which was held in Berlin from 20th to 23rd September; are they likely to have an influence on the previous attitude of the German Federal Government?

Answer: The Berlin Conference on "Energy from Biomass" was organised by the Commission of the European Communities with the support of the Federal Ministry for Research and my own Ministry. The range of subjects was very broad; the Conference dealt not only with possible ways of producing energy from biomass in Europe but also went into considerable detail on the importance of big-energy for the developing countries.

The insights gained by my Ministry or previously held views confirmed by the Conference are set out below:

1) From the point of view of potential use alone, about five percent of the primary energy requirements in the EEC could be supplied from biomass by the year 2000 without detriment to food supplies within the Community or the Community's food aid to the countries of the Third World.

2) In order to be able to make use of the potential, a determined effort must be made to push ahead with research into the problem of ensuring constant supplies of raw materials, and to carry out appropriate pilot and demonstration projects.

3) Since, on account of the many uncertain factors in the world economy, it is difficult to make reliable predictions about the price of oil and agricultural products in the future, and since supplies of raw materials – apart from various residual and waste products – are not yet really competitive, it would not yet seem sensible from a cost/ benefit point of view to take far reaching political decisions to divert surplus agricultural production capacity to the industrial use of biomass.

The Federal German Government will therefore continue for the time being its "precautionary strategy". This involves the following measures in particular:

1. Continued implementation of the ongoing special research programme entitled "Raw Material Supplies";
2. Continued promotion of selected research and development programmes on straw and timber burning and biogas production;
3. Promotion of the construction of two commercial experimental plants for the production of bioethanol;
4. Improvement of competitiveness, especially of starch, sugar, vegetable fats and oils as a chemical primary material within the EEC member countries.

#### Cooperation in Research and Technology Expanded

An agreement on cooperation in the field of radio navigation systems for civil aviation was signed at the end of 1982 by leading representatives of the Bonn Ministry for Research and Technology and the Ministry for Electro-Industries of the People's Republic of China.

It marked an expansion – of the cooperation which was established between the governments of the two countries in research and technology in October 1978. The programme includes the exchange of scientists and experts, seminars, and above all, research projects of several years duration. It covers a broad range of fields with special emphasis on research into energy and raw material.

## News from GATE

Smokeless Cooker  
Biogas  
Butter Press

### "Smokeless Cooker" – Programme

At present, a programme is under way at GATE on the dissemination of fuelwood-saving cookers, so-called "smokeless-cookers". Experience has been collected on various types of cookers, partly in connection with the German Forest Project in Upper Volta. In the course of this year, GATE will begin with one or two other projects of that type.

An exhibition at GATE during the turn of the year 1982/83 provided some insight into fuel wood-saving cookers. Among other types, the following were presented: A popular charcoal grill from Portugal, a charcoal cooker from Kenya, a Z-stove from the United States of America, a Hoesch Estel field cooker, a fuel-saving cooker with two cooking plates from Sri Lanka, and finally the model of a fuel-saving cooker.

It is one essential objective to contribute, with such cookers, towards saving energy in the field of private consumption. Only few foodstuffs can be eaten "raw" without any further processing. Most vegetables and animal products are prepared for eating by heating them. Cooking, roasting, grilling and baking are typical ways of preparing food.

The necessary heat is still obtained in many parts of the world with an open three-stone fire. Wood is still the traditional fuel material.

Given the growing population, the increase in animal husbandry, the rise in land under cultivation and the wasteful exploitation of forests, conditioned by the economic situation, the supply with fuelwood is jeopardised

in more and more countries of the Third World. The energy crisis in the developing countries is a two-fold one: The modern sector is hampered by the sharp rise in world market prices for fossil fuels, and the traditional sector and, thus, most of the people in these countries, suffers from the fuelwood crisis.

Attempts are now being made to counteract this development by means of large-scale afforestation measures; however, what has been done until today and is being done at present is far from being sufficient. Afforestation measures must be further stepped up; at the same time, however, other ways must be explored to master this critical situation. Saving fuelwood is one of them.

A decrease in the consumption of fuelwood can be achieved with smokeless cookers replacing traditional fire-places of little efficiency. Since Singer did his first tests in this field at the beginning of the 1960s in Indonesia, a great number of types of cookers have been developed. GTZ, too, has been working for some time on such models.

In the course of this work it turned out that it was not possible to develop just "one optimal type" of cooker. The only way to proceed is to try, project by project, to find a suitable type of "smokeless cooker" adapted in each case to the respective local conditions.

For this reason, the GATE programme under preparation is a multidisciplinary one. The experts working on it must be able to deal with the technical aspects (design, construction and testing of cookers) and they must have a feeling for the cultural and socio-economic consequences.

### Cleaning Biogas

A report recently presented to GATE provides a survey of all the main factors involved in constructing and running desulfurization units for biogas plants. It also contains instructions and information about how to calculate the correct size of the equipment.

Biogas is a mixture of methane, carbon dioxide and small quantities (< 3%) of various other gases. One of these trace elements in biogas is hydrogen sulphide ( $H_2S$ ). Its normal concentration is 1500–5000 ppm (0.15–0.5 Vol. % = 2. 1– 7.9  $H_2S$  m<sup>3</sup>).

$H_2S$  is corrosive to different parts of the digester, tubes, burners, valves and gas-engines. When using biogas with a normal  $H_2S$  -content in the normal concentration as a fuel for gasengines, there are a lot of problems with corrosion inside the engine. Several parts of the engine are very sensitive to  $H_2S$  and  $SO_2$  (the oxidation product of  $H_2S$ ).

The uncleaned gas brings more costs for repair and attendance as well as extra costs for sparking plugs and lubrication oil. Even special lubrication oil must be changed five times often as using uncleaned biogas with only a little or no  $H_2S$ .

Under its biogas dissemination programme, GATE has been seeking ways of removing the  $H_2S$  from biogas. It commissioned a German firm of engineering consultants to carry out studies on desulfurization and to develop a small desulfurization unit easy to construct and easy to run (gas throughput: a few m<sup>3</sup>/h).

The biogas containing  $H_2S$  flows from the bottom to the top through the sulfur absorbent. From the top of the desulfurization reactor the clean biogas flows to a gas-engine for example. After some time the absorbent is loaded with sulfur by  $H_2S$ . It's possible to regenerate it inside or outside of the reactor.

Only dry-cleaning-processes can be accepted for the desulfurization or the reduction of  $H_2S$  -concentration in biogas on a small scale. They are not too expensive and not too difficult, but they can bring good results. The absorbent for  $H_2S$  is a ferruginous mass with iron in a special compound. There are some different commercial sulfurabsorbents in Germany being used in different gas-plants. But it is possible to make one's own absorbent using genuine soils in tropical and subtropical countries.

The instructions for constructing desulfurization units will probably be available in English, Spanish and German by April. It may then be obtained under the "Question and Answer Service" from GATE (Post Box 5180, D-6236 Eschborn 1, FRO).

### New Hand-press – more Shea Butter

First experiments with a hydraulic hand-press to produce shea butter were exceptionally good.

The press, tested within a GATE supported project in two villages in Mali, Markakungo and Zambougou, increases the yield of fat by almost 100 per cent. Simultaneously, labour was cut down substantially. Shea butter covers a large part of the edible fat requirements in some West African countries. Traditionally, it is produced by women in a rather labour-intensive process.

A detailed report on the experience made when testing the new press will be published by "gate" in one of the next editions.

## **Bookbox**

Construction  
Gasification  
Bee Keeping  
Directories

### Construction Technology

The textbook "Construction Technology for a Tropical Developing Country" is the outcome of a technical assistance contract between the Federal Ministry for Economic Cooperation, the GTZ and the Department of Architecture of the University of Science and Technology in Kumasi, Ghana. It is meant to offer students of Architecture, Building Technology and those interested in Appropriate Technology in tropical developing countries an understanding of the traditional construction methods in the different climatic zones of an African developing country; of the materials which are available in such a country; of conventional building materials; of materials made from agricultural, forestry and industrial wastes and used for construction; of timber and how it can be used in construction; of construction technology and of basic services which are appropriate to local conditions and resources. Uses of local materials for construction in other tropical developing countries with conditions similar to Ghana are also listed.

A change from the so-called "concrete mentality" (which expresses itself in statements like "mud is primitive", "concrete means progress". . .) is very necessary, especially in view of the staggering shortage of decent and economic housing for the rapidly growing number of the urban poor and for the rural population in tropical developing countries. Equally necessary is the provision of clean water and adequate sanitation in these countries.

The book includes many proposals in form of construction details, sketches and photographs which show different ways of building in tropical developing countries. It is hoped that it will contribute to the attempts which have been made by many institutions, schools and colleges to introduce appropriate construction methods.

"Construction Technology for a Tropical Developing Country": by Hannah Schreckenbach with the assistance of Jackson G. K Abankwa. Edited by GTZ, 1983, English. Available from: TZ-Verlagsgesellschaft, Bruchwiesenweg 19, D-6101 Rossdorf, FRG (price not yet calculated).

SATIS Publications 1983

The List is a result of a collective work of SATIS (Socially Appropriate Technology International Information Service) members. It describes the 672 publications which are distributed or sold by the SATIS members in their working languages. It is the most comprehensive list of available publications in different languages, and it has been praised already for the special attention paid to publications from the South.

The list is available from: TOOL, Mauritskade 61 a, 1092 Amsterdam, Netherland.

### Bee Keeping (I)

For some years the authors of this book have been involved in planning, control and advisory activity for bee keeping technical aid programmes and with publications related to them. They have frequently been disturbed by the lack of knowledge among aid agencies about work already done, that could throw light on proposals currently under consideration, and by the inadequate exchange of information between the bee keeping experts involved. As a result, time and money have been wasted; sometimes the progress of bee keeping has even been yet back because actions were based on inadequate knowledge.

The authors are convinced that in developing countries the introduction of bee keeping, and the promotion of more advanced bee keeping techniques, are potentially of fundamental help to the peasant population. They have therefore collected information about existing proposals and projects, so that these can serve as a starting point for future activity. Some general advice on the planning and implementation of new projects is also offered.

"Bee Keeping – a Directory and Guide", by Wilhelm Drescher and Eva Crane. 166 pages, English. ISBN 3-88085-111-5. DM 39,80. GTZ publication No. 114. Available from: TZ Verlagsgesellschaft, Bruchwiesenweg 19, D-6101 Rossdorf, FRG

#### Bee Keeping (II)

In Botswana, the interest in bee keeping has grown enormously, since a first edition of a "Bee Keeping Handbook" has been published a couple of years ago. In a new edition, recently published, some of the materials have been revised and expanded in the light of the authors experience over the past two years. Bee keeping on an small, especially as top bar hives can easily be made for very little money.

This handbook provides all the information required to start bee keeping. It is not as difficult and dangerous as one might imagine. African honeybees are very industrious, but are also known to be vicious. However, with a good understanding of their behaviour and by practicing the methods described in this book, the bees will react in a friendly way.

"Bee Keeping Handbook" by B. Clauss, 2nd edition 1982. 76 pages, English. Published by the Agricultural Information Service, Gaborone. For further information: Ministry of Agriculture, Bee Keeping Officer, Private Bag 003, Gaborone, Botswana. i.

#### RE Directory

In November 1980, the UNESCO secretariat in cooperation with the Solar Energy Research Institute (SERI) in the United States initiated a Directory of New and Renewable Energy (RE) Information Sources. Its preparation was an outgrowth of the findings of a preliminary study on an International Information System Relating to New and Renewable Energy Sources, conducted by the Secretariat in 1980. The study emphasized the critical role of information available and transfer in the effective exploitation of new and renewable energy resources, particularly for developing countries.

The directory is intended to facilitate information availability and transfer by providing names and addresses of resource organisations, institutions and publications with expertise in some area of RE. In preparing the first edition, a data-collection deadline of 1 December 1981 was strictly observed. Eligible material received subsequent to that date will appear in the next edition of the Directory scheduled for publication in 1983. It is intended to update the Directory at least annually.

In addition to the printed form, the Directory is also available as a computerised data base for on-line searching purposes.

"International Directory of New and Renewable Energy Information Sources and Research Centres": prepared jointly by the UNESCO and the SEMI, 1982. 469 pages, English. For further information: UNESCO, 7, Place de Fontenoy, F-75700 Paris, France.

#### Bibliographies

GATE has just completed an investigation into the subjects of Sisal Waste and Banana Rejects, and compiled two comprehensive bibliographies.

These bibliographies may be obtained from GATE, section 211. Furthermore, some of the articles listed can be supplied on request to persons from developing countries (for address: see above).

#### Wood Gasification

An energy network which is limited to only a few resources can cause negative ecological and social consequences which might be very difficult to correct. The concentration of carbon dioxide in our atmosphere as a result of burning fossil fuels or the political dependence upon suppliers of raw materials are well-known examples. An energy supply, ecologically and socially safe, would have to open up and develop all available

resources and take good account of the local conditions when doing so.

Wood as a renewable source of energy is a good solution for decentralised use. However, a sustained and careful forestry management must be installed as the eco-system "forests" plays a key role in maintaining nature's equilibrium on a global scale. One way to use local energy resources of wood would be its gasification.

The Report under discussion here gives a survey on processes and techniques of wood gasification. Apart from describing processes, the composition of raw materials and gas is dealt with. The use of wood-gas in combustion engines is given special attention as it might turn into a very important field of application. The text is illustrated by tables and pictures. The annex contains the names of European producers of wood gasification plants.

"Holzvergasung – umweltfreundliche und effiziente Energieholznutzung" (wood gasification – a non-polluting and efficient use of wood for energy purposes), by Willy Bierter and Christian Gaegauf. Edited by C. F. Müller, Karlsruhe 1982, Reihe Alternative Konzepte, volume 39. In the German language. ISBN 3-7880 9668-3. DM 9.80.

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GATE is not only the name of this quarterly. It also stands for German Appropriate Technology Exchange, founded in 1978 as a special division (Division 4020) of the government-owned Deutsche Gesellschaft für Technische Zusammenarbeit (GTZ) GmbH (German Agency for Technical Cooperation).

### Tasks

GATE is a centre for the dissemination and promotion of appropriate technologies for developing countries. GATE defines "appropriate technologies" as those which appear particularly apposite in the light of economic, social and cultural criteria. They should contribute to socio-economic development whilst ensuring optimal utilization of resources and minimal detriment to the environment. Depending on the case at hand a traditional, intermediate or highly developed technology can be the "appropriate" one.

### Activities

GATE focusses its work on the following areas:

- Technology Dissemination: Collecting, processing and disseminating information on technologies appropriate to the needs of the developing countries. ascertaining the technological requirements of Third World countries; support in the form of personnel, material and equipment to promote the development and adaptation of technologies for developing countries.
- Research and Development: Conducting and/or promoting research and development work in appropriate technologies.
- Cooperation in Technological Development: Cooperation in the form of joint projects with relevant institutions in developing countries and in the Federal Republic of Germany.
- Environmental Protection: The growing importance of ecology and environmental protection requires better coordination and harmonization of projects. In order to tackle these tasks more effectively, a coordination centre was set up within GATE in 1985.

### Service

GATE offers a free information service in appropriate technologies for all public and private development institutions in countries dealing with the development, adaptation application and introduction of technologies.

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