

Renewable Energy for Development

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The Bemused Observer - An Interview with Gerald Leach

This interview with Gerry Leach, former SEI Senior Research Fellow, was conducted last summer in London by Mattias Nordström, Research Associate in the SEI-Stockholm Energy Programme. With the unfortunate passing of Gerry in December, the interview has taken on special meaning. Gerry's long career and unique contribution to the field of energy, environment, and development provides a historical perspective on the evolving role of energy services in today's global economy.

Q: Who is the bemused observer?

The bemused observer was born at the World Bank Energy Week a few years ago where I was appalled by the focus on a few technologies with very little reference to the intended users. There's a crazy world out there, and in my self-appointed role as a bemused observer I can stand back and point at things that worry me.

Q: How did you end up in the field of renewable energy?

I've had two careers. The first 20 years of my professional life I was a science journalist working for the BBC, New Statesman, Penguin Books and The Observer. In that business I got interested in energy questions. In 1965 I wrote a book on energy for teenagers called *New*

Sources of Energy. In 1972 I shifted my focus to the looming threats of global food and oil shortages and realised that the industrialised world had solved its agricultural productivity by increasing the energy input to the food chain. I wrote a book called *Energy and Food Production*, which in turn brought me into the wide field of energy, environment and global equity.

My second career started in Tanzania a quarter of a century ago, in 1980, when President Nyerere asked the UK's Commonwealth Secretariat for help in developing a long-term energy policy to reduce dependence on imported oil. The times were difficult and we worked out of Nyerere's office, where photocopies were rationed to three pages per month.

At the time, electricity accounted for

around 2% of the country's energy use and biomass fuels for around 95%. Most donor aid went to the former, virtually none to the latter, even though everyone was convinced that the country was facing an acute fuelwood crisis. When calls for plantations went unanswered by the rural population the general view was that farmers were stupid and did not know where their best interest lay. However, surveys in rural areas showed that energy was not at all perceived as a priority by the villagers themselves.

Ever since, certain aspects of the fuelwood crisis have haunted us. Real-life and quite recent examples include countries where national statistics did not include the huge numbers of trees outside areas that the government surveyors had designated as forests. When coupled with data on fuelwood consumption and lack of field surveys on the actual number of trees it led to alarmist predictions of an imminent fuelwood crisis. In this particular instance, I was in a team that actually went out and looked at the farmlands – and realised there were plenty of trees in the areas that showed up as “non-forests” on the surveyor maps.

In Memoriam: Gerald Adrian Leach, 1933-2004

Gerry Leach, a Senior Research Fellow with SEI since its founding in 1989, passed away on 10 December 2004. He was a true colleague and friend to so many people during a thirty-year career in the areas of energy, environment, climate change and development. While recognising the seriousness of the issues at hand, he also approached his work with generosity, sincerity, and a sense of humour that helped to inspire and energise his colleagues. He will be sorely missed by his colleagues, but the spirit of his work will live on. We dedicate this issue of the newsletter to him and include an interview with him that was conducted last summer. The SEI website also has a dedication with some remembrances of Gerry.



Gerald Leach

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Q: You have worked a lot on the fuelwood crisis - what is the origin of this concept?

Energy experts see women carrying bundles of sticks and assume that there must be a shortage of fuelwood. What they often don't realise is that the same women walk similar – or longer – distances to the market, carrying agriculture produce, or to get water. Energy is not unique in this respect and no more a crisis than a lot of other hardships facing poor people.

My point is that when asked about their energy problems, people often react with a “to hell with all that – we have a water problem, a land tenure problem, a democracy problem – and energy is no. 5 on our list.” If energy was really the number one priority for people, we would see local actions of all sorts to get access to more energy!

Q: What is your fondest memory of renewable energy for development?

The true answer is sitting on a veranda with a cold beer after a good day's work and chatting with your colleagues about the next day's business.

However, I do remember a dramatic moment in a country – I won't say which – when I was in a cabinet-level meeting on biomass energy. The Minister for energy said that bioenergy was not interesting to the government, as they were going to electrify the entire population and provide electric cook stoves for all households. A quick calculation showed that this would make demand exceed installed capacity by about three times – and I told him so! This can serve as an example of the political aspects that can make working with energy so frustrating.

Q: What is the most important transition in the field during your career?

Before the first oil price shock, no one really looked at energy consumers. It was all about coal mines and power plants – the supply side of energy. But after the oil crisis, people began to be more interested in the end-users, and early surveys of them made us realise that the consumption projections used at the time were nonsense. Most of the energy was used for water and space heating, and there is a limit to how much is needed for that. In 1979, in a book called *A Low Energy Strategy for the United Kingdom*, we produced a scenario which showed that the combined effects of increased efficiency and introduction of renewables would soon make the consumption curve for fossil fuels go flat. History shows that in the year 2000, instead of climbing sky high as the government had predicted, energy use was only 6% higher than we had predicted – we had been right! We had been right, I said, even though it was for the wrong reason. But that is another story...

The point I'd like to make is: The future is not something inevitable, but we can shape it ourselves. This lesson led me to work with developing countries, to help shape a better future.

One of the things that has struck me most is that in the early '80s, when I worked a lot in Asia, it was all very centralised – governments knew what was good for the people. I saw a showcase village where fancy energy equipment, equivalent to USD 200 per person in hardware, was being installed. I asked the question what would happen if the villagers could choose between this and getting USD 200 in cash. The answer was

simply that this wasn't an option as it was an energy project!

Since that time, the pendulum has swung towards a market-oriented system based on informed choice. However, we still see many top-steered projects where energy experts know better than the users.

Q: What do you see as the most urgent need to address if we are ever to see a sustainable energy system that is beneficial to everyone?

Simple. Move from projects to policies! One short example (again, won't name the country): Three northern European bilateral agencies were doing parallel projects on industrial electricity generation from bagasse. A while later, the government changed the policy for Independent Power Producers and within a few months, foreign investors were in the country doing what the bilaterals had tried for years.

We've got to get moving! The rate of electrification is falling behind the population growth. How to do it? We need to make sure that good policies are put in place, and not trust projects to drive development. A cynical remark, however, is that it is hard to get funding for things other than projects.

Q: Anything else you want to tell the readers of RED?

A word of advice from me, after having spent 30 years in the business, is – for heavens sake don't believe that energy is all that matters! There is so much more behind development that it's not possible to push development by just turning up the energy input. ■

The Stockholm Environment Institute (SEI) is an international research institute focusing on sustainable development. The Institute works through an international network of centres, associates, and field staff around the world.

The Climate and Energy Resources Programme is concerned with improving access to environmentally friendly energy services, promoting renewable energy and energy efficiency, and advancing global cooperation on climate change.

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Renewable Energy Technologies for Decentralised Rural Electricity Services

Björn Kjellström, Exergetics AB, Sweden

Renewable energy technologies for decentralised electricity generation are commercially available and are successfully being applied in many developing countries. The choice of technology must be based on the needs and priorities of the local population. Supply systems should be designed to facilitate income-generating activities. A combination of conventional diesel generator and renewables is often more cost-effective than systems based entirely on locally available renewable sources. Subsidies to electricity consumers in rural areas are justified for equity reasons and should be independent of the supply technology. Additional subsidies for renewable energy can be justified for introductory periods.

These were the main conclusions from a workshop on “Renewable energy technologies for decentralised rural electricity services” arranged June 10-12, 2004 in Stugsvik, Sweden by KTH International Education and Training AB and Stockholm



Photo: www.ufpa.br/rgedae

Praia Grande–Ponta de Pedras–Ilha do Marajó–PA, Brazil

Hybrid system: 7,5 kVA diesel; 2 wind turbines 10 kW/15 kW.

In operation since 1999 (125 people)



Photo: www.creesb.cepel.br

Joanes-PA, Brazil.

Hybrid system: 52 kVA diesel; 10.2 kWp¹ solar PV; 40 kW wind farm.
In operation since 1994

Environment Institute. The workshop was financed by Sida.

Workshop objectives

The objectives of the workshop were:

- to evaluate experiences from use of renewable energy sources for rural electrification in developing countries;
- to make recommendations for donor support to rural electrification projects using renewable energy sources.

The invited 24 participants came from government agencies, donor agencies, universities, and consulting companies, all with long experience in implementing renewable energy projects for decentralised electricity generation. The developing countries represented at the workshop were Brazil, India, Kenya, Mali, Mongolia, Nepal and Uganda.

After keynote presentations that covered the experiences from different renewable electricity generation technologies in selected developing countries, the participants discussed the role of electrification in rural development, needs for further technological improvements and the needs for development of government policies for promotion of renewable energy for electricity generation. Finally, the

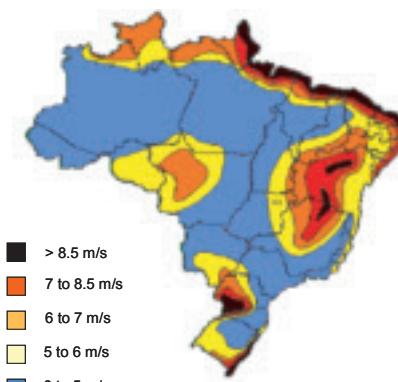
1 kWp = kW peak

participants discussed and agreed on recommendations for donor agencies and for Energy Policy Formulation.

Electrification for rural development

Renewable energy technologies should be considered when they offer advantages compared to conventional alternatives, grid connection or stand-alone diesel generators.

Advantages might include lower costs, better supply reliability, less adverse local environmental impacts, and better possibilities for local income gen-



www.creesb.cepel.br

Wind energy potential in Brazil: 43 GW.
Source: The Brazilian Solar and Wind Energy Reference Centre

erating activities. The local needs and priorities must determine the choice of technology.

Biomass-fuelled renewable technologies have a particularly strong potential for stimulating income-generating activities compared to conventional supply options.

The biomass fuel chain often involves many different local actors, including small-growers, equipment suppliers, and entrepreneurs who are needed for distribution, transport, and end-user services. Consequently, biomass systems generally have much stronger links to creation of sustainable livelihoods com-

pared to both conventional options and other renewables.

Desirable technical improvements

Technologies for de-centralised electricity generation using mini-hydro power plants, solar photovoltaics (PV), wind generators and biomass fuels are commercially available and are being applied in many developing countries.

The limiting factors for further penetration of renewable energy are today linked to issues of cost, financing, service infrastructure, awareness of avail-



Photo: www.upa.br/gedae

Hybrid photovoltaic mini-grid system with diesel as backup in Gobi Desert, Mongolia.

load factor, when the necessary amounts of biomass fuels can be supplied in a sustainable way. For smaller power demands (down to 15 kW), biomass gasification and use of the gas as fuel in an internal combustion engine is often the most realistic option. Both technologies are commercially available. Better fuel flexibility and reduced needs for service and maintenance are possible improvements in the

biomass is used as fuel. Diesel generators can then be used for peak load supply and as reserve capacity.

Government policies for promotion of renewable energy

Governments in developing countries have various reasons to promote the use of renewable energy for rural electrification. Minimising greenhouse gas emissions may not be a priority from the national perspective, but can be seen as a rationale for support from developed countries through CDM and other mechanisms.

There are several effective mechanisms for promotion of renewable energy for rural electrification. Promotion by strong commercial actors has proven



Photo: Maria Morales, SEI

Bagasse deposit at a sugar factory in Zambia symbolises the under-utilised biomass resources that are readily available.

biomass gasification process that would make this option more attractive in comparison with diesel generators.

For wind generators and PV, energy storage is necessary in most applications. The development of storage systems with lower life cycle costs would make these systems more competitive. Hybrid systems using diesel generators is an option that deserves more attention. Hybrid generation can also be cost effective when



Photo: Maria Morales, SEI

Nakambala Sugar micro-hydro Plant, Kafue Tributary, Zambia

very effective for PV and to some extent for wind but for biomass and mini-hydro such actors have been less effective. Support should be given for setting up local or regional organisations with the task to promote these technologies where the local conditions are suitable.

Subsidies to electricity consumers in rural areas are justified for equity reasons and are given also in developed countries, mainly as cross-subsidies where urban users carry part of the cost for electricity supply to rural areas. The subsidies should be independent of the supply technology. Additional subsidies for electrification schemes using renewable energy can be justified for limited introductory periods when demonstration of the performance and reliability of the technology is necessary.

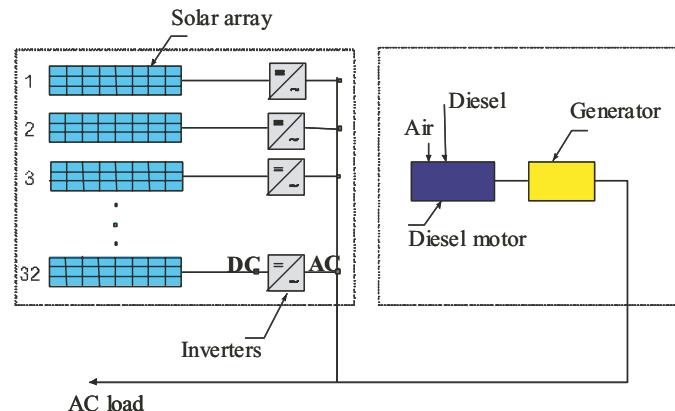
Governments should take responsibility for workforce development to utilise the indigenous renewable energy potential. This includes training of the necessary labour force to ensure sustainable maintenance of renewable energy technologies.

Recommendations to donor agencies
Donors should support development of national energy policies that include support to rural electrification using renewable energy technologies where this is economically justified. The economic evaluations should include consideration of local environmental improvements and other benefits of renewable energy systems, such as improved supply reliability, reduced vulnerability to international price fluctuations and the creation of local employment opportunities. The expected impacts on rural development and poverty



Photo: Edson Bazzo, UFS

Diesel engine generator



Schematic for hybrid photovoltaic/diesel systems for isolated areas

alleviation should be the main basis for selection of rural electrification projects for financing. This means that possibilities to find productive uses of the electricity should be very important for project selection.

Donors should support the development of regulatory frameworks and institutions that incorporate the goals of improving the techno-economic efficiency as well as addressing social and environmental development goals in power sector reform processes.

When renewable energy is economically justified, donors should support these options and be prepared to cover the transaction costs associated with introduction of technologies that have previously not been used in the area, such as costs for workforce development. Electrification schemes using renewable energy that are more costly than conventional options may be given support, but in these cases the additional cost must be borne by the donor and not by the users.

Donors should support the development, adaptation, testing and use of new technologies. This can stimulate business development, provide employment opportunities and generate more appropriate technologies. Donors need to accept a higher degree of risk in this context. Technologies should be developed in close cooperation and with strong local ownership from researchers, institutions and the private sector in the countries where the technology shall be applied and in a context where electricity consumers are not exposed to any technological risk. A rural village in a de-

veloping country should not be a testing ground for un-proven technology.

Donors should support the local manufacturing of equipment for renewable energy, but only on strictly commercial terms.

Donors should support institutions and capacity building of the actors as the electricity sector goes through restructuring.



Photo: Ricardo Ruther, LabSolar/UFS

Hybrid system, diesel/solar PV, installed in the Brazilian rain forest (Araras-RO), 20 kWp connected to the isolated grid, in operation since April 2001

Support to national organisations that can act as advisors on legal, technical and administrative matters to small private or cooperative electric utilities can be essential for the success of locally managed distributed electricity supply in rural areas. Significant participation of local consultants shall always be required in donor-financed projects.

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Refocus on Renewables – the Bonn Conference

By Yong Chen, Stockholm Environment Institute

There have been many global assessments of renewable energy potential and evaluations of the role of renewable energy systems in different economic settings and geographic regions. However, in terms of international action platforms, there has generally not been a concerted effort to link the implementation of renewable energy technologies to sustainable development goals. The decision taken at the World Summit for Sustainable Development (WSSD) in Johannesburg in 2002 to hold an International Conference for Renewable Energies was thus a major breakthrough in improving international cooperation on advancing the crucial role of renewable energy technologies in supporting a global transition towards sustainability. The Conference was held in Bonn, Germany in 2004.

The UN Conference in Rio de Janeiro in 1992 was aimed at developing a roadmap to ensure a healthy planet for future generations. However, energy issues were not on the main agenda, nor among the focus areas of Agenda 21, one of the most significant outcomes from Rio. Increased attention to the role of energy in sustainable development was not given until the 19th Special Session of the UN General Assembly in New York, five years after Rio.

Approximately one year before the World Summit for Sustainable Development (WSSD) at Johannesburg in 2002, the Ninth Session of the Commission on Sustainable Development (CSD-9) was held in New York. This was the first time that energy for sustainable development was discussed as a major theme at an intergovernmental level. Renewable energy, because of its potentially climate-neutral nature, important role in poverty alleviation, and its improving technological maturity, became a key focus of the



Photo: renewables2004.de/conference gallery
tional organisations, and civil society, private sector and other stakeholder groups provided opinions on the development of renewable energies.

Main Outcomes of the Bonn Conference

Three important issues were agreed on as conclusion of the Conference:

- **A Political Declaration** containing a political consensus on the role that renewable energies should play in the future, based on a common vision to achieve better and more equitable access to energy and increased energy efficiency.

- **An International Action Programme**, in order to make goals achievable, including actions and commitments by governments, international organisations and various stakeholders. Conference participants contributed to the Action Programme with commitments to goals, targets and actions within their own fields of responsibility.

- **Policy Recommendations for Renewable Energies**, including policy guidelines for the benefit of governments, international organisations and stakeholders as they develop new approaches and strategies and formulate new roles and responsibilities of the key actors.

Aside from discussions on the core themes, a number of related events took place, such as the International Parliamentary Forum, Sustainable Energy Finance Event, Business Forum and Local Renewables. More information is available on the website www.renewables2004.de.

This Conference is considered a key post-Johannesburg follow-up, not only because it will serve as a forum for international discussion on promotion of renewable energies, but also because it will probably become a milestone in the course of speeding up the use of renewables worldwide. ■

Dimensions of the Bonn Conference

The Bonn Conference set the focus on exploring ways through which the ultimate goal of substantially increasing the global share of renewable energies in the energy supply mix can be achieved. This propelled the formation of the following three particular themes for the Conference:

1. **Political and Policy Dimension:** to enable political frameworks to foster market development of renewable energies
2. **Financial Dimension:** to increase private and public financing in order to secure reliable demand for renewable energies.
3. **Human and Institutional Dimension:** to strengthen capacity-building and coordination mechanisms, and to intensify research and development.

3600 participants, representing national governments, the UN and other interna-

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New Momentum for Bioenergy Initiatives in the Brazilian Sugar Industry: report on recent events

by Frank Rosillo-Calle, Imperial College, London

In Brazil the combination of emerging opportunities in sugar, ethanol and cogeneration along with increased professionalism and changing attitudes is reviving the sugar industry and triggering more ambitious bioenergy initiatives that are linked to the sugar industry.

Two different events took place in Brazil during 14-17 September 2004 that, although different in magnitude and content, both dealt with the sugar industry in Brazil.

Both events took place in a particularly favourable moment in Brazil, where the sugarcane and ethanol sectors are going through an expanding phase. High prices for sugar and ethanol together with expected higher demand for these products in the near future are creating a momentum for rapid expansion. In addition, high crude oil prices are foreseen to continue or even increase over the long term.

Both events also underscored the key linkages between bioenergy development and the resurgence of Brazil's world-class sugar and ethanol industries.

FENASUCRO: Sugar and Ethanol Industrial Fair

The FENASUCRO- 12th International Sugar and Ethanol Industrial Fair, organised by CENBIO2, is one of the largest technological events in the sugar and ethanol sector worldwide, where 320 exhibitors showed an overwhelming array of technologies and services related to the sugarcane and ethanol industry. The exhibition was visited by over 35000 people, mostly professionals from Brazil and many other countries, particularly from Latin America. FENASUCRO, an annual event which is in its 12th year, is the giant of the



Photo: www.portalunica.com.br

Sugarcane field, Pongá, Brazil

sector and has generated business equivalent to about 140 M Euros. The increased interest in FENASUCRO in recent years is not only a reflection of the organisers ability to attract so much interest in this type of event, but also the profound transformation, growing interest and maturity of the sugar industry in Brazil.

Ribeirão Preto LAMNET Workshop

The second event was the Ribeirão Preto 9th- LAMNET Workshop. The Latin America Thematic Network deals with Bioenergy Policies, Technologies and Financing. The network is supported by the

European Commission-Directorate General for Research, Fifth Framework Programme. The scientific focus of this LAMNET workshop was:

- Biodiesel production and utilisation in Brazil and bioenergy for sustainable development
- The emergence of the “flex-fuel vehicle” which is having enormous success among Brazilian consumers.

Biodiesel programme

Biodiesel, widely discussed at the LAMNET event, is currently a hot topic in Brazil because there is a real possibility of setting up a nationwide biodiesel programme. A Biodiesel Programme is a priority for Brazil and close to the top of President Lula's national agenda. In 2003, Brazil consumed approximately 38 billion litres of diesel and 6 billion litres were imported. A large biodiesel programme could replace most of the imported diesel while creating some 200,000 new jobs in rural areas (see www.procana.com.br and www.bioenergy-lamnet.org). Brazil has the potential to be a world leader in biodiesel production as it will be able to produce biodiesel from many different sources (i.e. palm oil, soybean, vegetables oil, etc).



Photo: www.portalunica.com.br

Sugarcane stalks



Photo: Bioalcohol Fuel Foundation

Flex-fuel vehicle (FFV). In Brazil, the FFVs introduced on the market in 2002 were designed to be able to run on any mixture of ethanol and gasoline. The consumer can choose the blend based on availability and price.

However, some problems seen at the policy level are likely to hinder the biodiesel programme since it is not clear how the various ministries are involved and at which level. Furthermore, there is no obvious hierarchy among the stakeholders involved. How these problems will be overcome is not clear yet, but it is for sure that Brazil is counting on the appropriate infrastructure and the technical capability to produce biodiesel in the near future.

Flex-Fuel Vehicles

Flex-fuel vehicles (FFVs) have also attracted considerable attention in Brazil because of the economic flexibility that they offer. The FFVs have revolutionised industry actors (car-makers, sugarcane and ethanol producers) and end-consumers. How the "flex-fuel" car has taken root in the Brazilian market has been truly remarkable. From just 0.3% of the market in 2002, it has reached a market share of 28% (151,000) in the period of January-August 2004. There are already 21 mod-

els being sold and by 2010 almost all cars are likely to be flex-fuel.

The most attractive feature of the "flex-fuel car" is the flexibility it offers to the consumers, who need not be too concerned with ethanol or gasoline availability since it will be possible to blend in any proportion. In addition, the end-user can choose the fuel blend according to the pump price. The FFVs are also very attractive to the ethanol producers and the car manufacturers because the concept stimulates demand, and provides greater flexibility without additional investment. The market price will be the determinant factor. One down side is that the flex-fuel motor is based on the traditional model that runs on gasoline rather than one that could be better optimised for ethanol and thus it is less fuel-efficient than an ethanol-based model. However, the "flex-fuel" car offers many other technical possibilities. Currently the car remains as "gasoline-based" because the vehicle manufacturers do not want to increase the price of the car. In the future it would be possible to increase energy efficiency and performance by introducing new engine modifications that provide a better balance in optimising the ethanol/gasoline design options. ■

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Advanced International Training Programme Opportunity in Ecological Sanitation

The overall objective of the training programme is to disseminate information and knowledge and to develop skills for new options in sanitation to support urban dwellers in reducing environmental health risks, improving nutritional status and protecting water resources and other environmental assets.

Ecological sanitation (ecosan) is an ecosystem based approach to sanitation, and multi-disciplinary in character. The training programme includes cultural and social desirability, hygiene aspects, handling of greywater, reuse of nutrients from human excreta in agriculture, protection of surface and ground water, financing, technical performance, promotion and community involvement, policy development and related institutional issues.

Deadline for applications is April 1, 2005.

For details regarding target group, content and schedule see:

www.ecosanres.org

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