



# Renewable Energy for Development

STOCKHOLM ENVIRONMENT INSTITUTE – NEWSLETTER OF THE ENERGY PROGRAMME

SEI • December 2005

Vol. 18

No. 3

ISSN 1101-8267

## Appropriating Technology in Melanesia

By Edward Smith, Independent Consultant

*Renewable energy technology in the form of micro-hydroelectric schemes is being used and appropriated by remote Melanesian villages in a way that meets first and foremost their unique development needs. Their specific aspirations for income and social justice become foremost. These projects are sensitive to a context of isolation and vulnerability, and have evolved into successful rural electrification initiatives driven by the stakeholders themselves, rather than imposed through traditional programmes of international technical assistance. The capacity for these projects to incorporate training and inclusive participation by women has become a case study in participatory development for the region.*

### Resource wealth and energy poverty: the Melanesian dilemma

Assessing the role of energy in the development dilemmas of remote Pacific island communities presents a problem of energy poverty that appears quite similar to the rural energy situation found in, for example, sub-Saharan Africa and parts of Southeast Asia and Latin America. However, the situation in the Pacific is also completely distinct from other regions and is unique in several critical aspects.<sup>1</sup> An understanding of these unique characteristics is required if projects are to successfully sustain the energy-for-development needs of these isolated communities.

<sup>1</sup> Paul Bryce and Chin Ching Soo, "PICs - a Very Different Context.", *ENERGIA News*, Volume 6, Issue 2, January 2004.



Photo: Edward Smith

*Raeao women installing mains wiring to a junction-box*

While the energy-for-development problems of the Pacific are unique, the problems facing Melanesian communities are different again from the rest of the Pacific. Unlike much of the region, the Melanesian countries have strong export sectors and natural resource endowments. Moreover, the extreme remoteness of Melanesian island communities presents unique problems for the provision of services, institutional governance, and the regulation of industry and other activities. Widely dispersed island geography and population distribution stifles economies of scale in infrastructure planning. Illegal and unsustainable logging is endemic, and poses a real threat to village livelihoods and island ecology. It was partly as a response to this situation, and the threat to fuelwood supplies, that led to Solomon Island village communities initiating micro-hydro projects.

The Solomon Islands is the second largest country in the insular Pacific, and comprises a double chain of six major

high islands and almost a thousand other smaller islands and atolls. It lies in the tropics, north of Australia and east of Papua New Guinea in the South West Pacific. (See map on page 4). Relative to most other Pacific island countries the population is large, and dozens of languages are spoken across the islands. The islands are especially vulnerable to natural disasters (including drought), sea level rise, forest depletion and land degradation, species invasion and coral reef destruction. While some subsistence cultivation contributes to land degradation, large scale commercial logging is by far the most serious threat.<sup>2</sup> Villages are usually located near the coast, and tenure over land and coastal waters is primarily along customary or clan lines. Most of the land is non-registered customary land.

In terms of basic human development indicators, the Solomon Islands is ranked towards the poorest end of the Pacific, along with Vanuatu and Papua New

<sup>2</sup> Government of the Solomon Islands, *National Report to the United Nations Convention to Combat Desertification*, June 2002.

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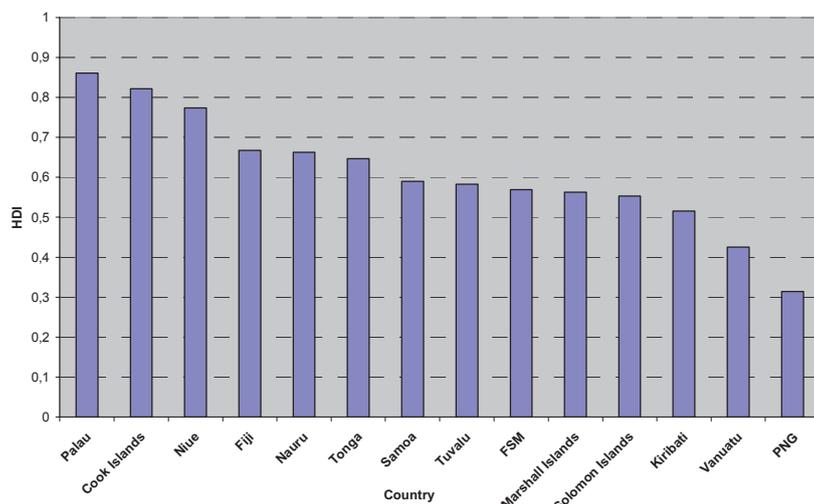


Figure 1. Selected Pacific Island Human Development Indices

Guinea. Access to electricity is limited to around 16% of the population.<sup>3</sup> The country's fragile economy is highly sensitive to commodity price movements, and global economic trends and shocks.

There are significant differences in the resource endowments between the provinces, and concerns that export earnings are not being remitted back into government accounts, let alone to the

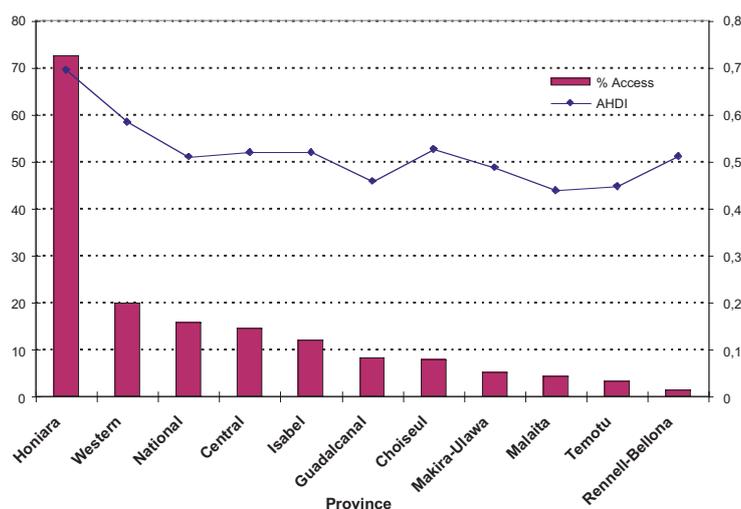


Figure 2. Access to electricity in the provinces of Solomon Islands lands<sup>3</sup>

<sup>3</sup> Solomon Islands Ministry of National Planning & Human Resource Development, *Solomon Islands Human Development Report, 2002: Building a Nation*, Solomon Islands Government, 2002. AHD Index refers to Alternative Human Development Index, which substitute access to services and economic assets for per capita GDP.

rural poor. Between 1999-2002 the country experienced an economic and civil crisis as a result of ethnic tension, and was taken to the brink of complete collapse before a regional assistance mission was established in 2003.

Use of energy in the Solomon Islands is characterised by high dependency on imports on the one hand, and the burning of mostly fuelwood and agri-residues on the other. Though petroleum dependency characterises the monetary sectors of the economy, the larger subsistence economy depends significantly on fuelwood and traditional energy carriers. The vast majority of the population is engaged in the subsistence economy. Copra is the major commercial agricultural crop, and is the single most important source of income for the rural population. Wood and coconut husk fuelled copra drying ovens are significant users of energy. Fuelwood for cooking and copra drying is the greatest source of primary energy, and households are the greatest consumers.

### The problem of petroleum dependency

The Solomon Islands Electricity Authority (SIEA) is responsible for public electricity supply and distribution. However, many private businesses and government operations, particularly agro-forestry activities, generate power independently from the SIEA supply. SIEA has diesel power plants located in towns throughout the Provinces. In 2003 the Solomon Islands spent \$87.9 million on fuel imports. Fuel accounts for 65% of SIEA operating costs.<sup>4</sup> The impact of diesel fuel dependency and costs on SIEA op-

<sup>4</sup> Central Bank of the Solomon Islands (CBSI), *Annual Report 2003*.

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.

This newsletter is supported by the Swedish International Development Cooperation Agency (Sida). The newsletter is distributed free of charge and

is also available through the SEI website.

The views expressed in the articles in this newsletter are those of the authors and not necessarily those of SEI nor of Sida.

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Managing Editor: **Anders Arvidson**

Editor: **Francis X. Johnson**

Publisher: **Arno Rosemarin**

Layout: **SEI/Solveig Nilsson**

Printer: **Grafisk Teknik AB**

ISSN 1101-8267

Printed on chlorine-free, 100 % recycled paper



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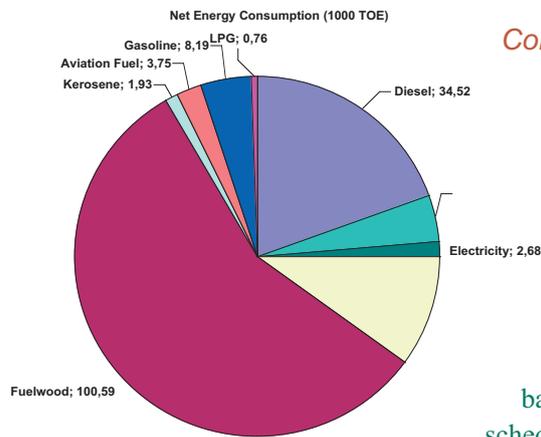
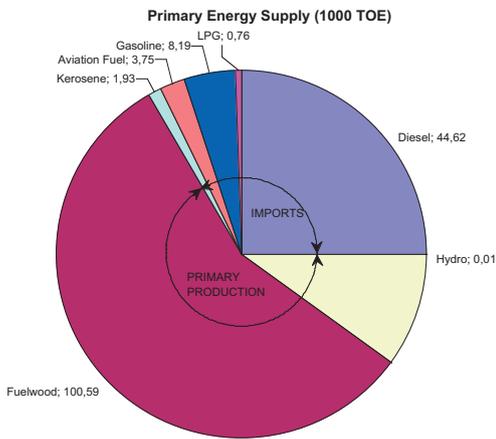


Figure 3. Solomon Islands energy balance <sup>5</sup>

TOE = (tonnes oil equivalent)

erations is a mainstream political issue in the Solomon Islands, and in 2002 (during the national financial crisis) the country experienced a series of major, debilitating power cuts simply as a result of SIEA being unable to pay its diesel fuel bills. This has provided additional impetus for businesses to generate their own power, and for the countries' hydro resources to be exploited. The mountainous topography and high rainfall (average rainfall is between 3500-5000 mm per annum) suggests significant hydro potential. However, geological and other considerations limit available sites for large reservoirs.<sup>5</sup> Despite strong international backing, proposals for several schemes have never been realised.

It has also provided an opportunity for proponents of renewable energy such as biomass and solar PV. Utilisation of solar PV is not nearly as widespread as elsewhere in the Pacific. The use of biomass residue derived fuels as a diesel substitute in power generation is of significant interest in the Solomon Islands. Proposals for pilot plants utilising oil palm and coconut residues are numerous. SIEA is currently testing a coconut oil fuel at its power station in Lata, reflecting the growing interest in the use of coconuts as a biofuel in the Pacific.

Smaller run-of-the river hydropower has real potential in some isolated communities, although the development of mini and micro-hydro in the provinces has historically been quite limited. However, several remote island villages in Western and Malaita provinces have successfully developed micro-hydro electrification projects themselves, some with assistance from APACE VFEG, an Australian NGO based at the University of Technology, Sydney. They provide technical assistance and advocacy at the behest of village communities interested in developing micro-hydro projects.

### Community-based village electrification

These micro-hydro schemes were implemented to provide on-the-job training for men and women equally, and to build in local capacity in all aspects of hydro scheme development. The community organises and plans its resources based on local value systems and schedules work for each stage of the project, calling on technical expertise when required (micro-hydro schemes may require considerable civil and electrical works). The approach might frustrate conventional energy infrastructure projects, however, these projects have delivered tangible long-term development benefits where others have failed.

Projects are financed by village associations or with part donor funding in the form of grants. Electricity tariffs to cover primarily O&M costs are usually implemented by village-based organisations. The village community owns and maintains the scheme, and financial returns to outside third-parties or commercial entities do not enter the equation. The schemes are expected to deliver in-

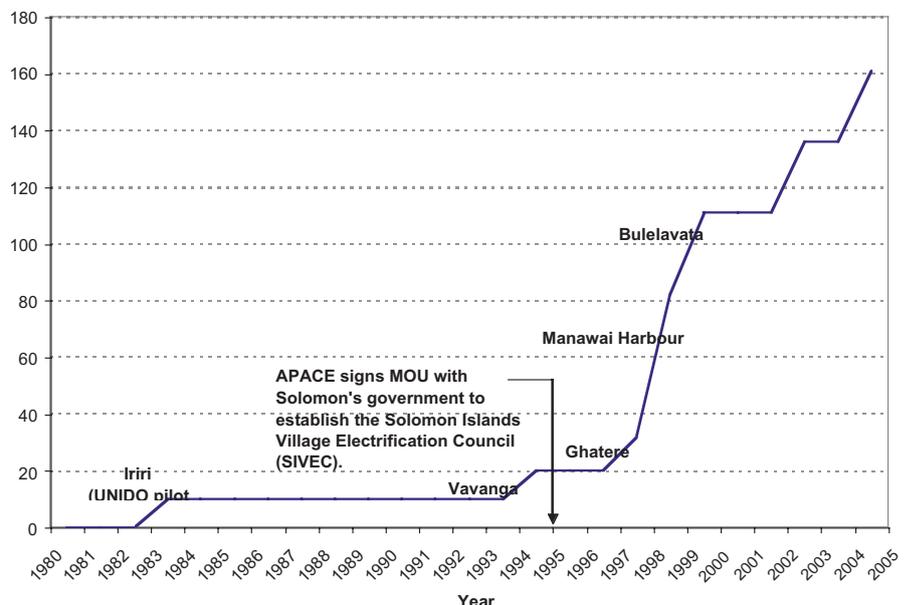


Figure 4. Micro-hydro projects involving APACE VFEG (Solomon Islands) <sup>6</sup>

<sup>6</sup> APACE VFEG Web:

www.apace.uts.edu.au. Not detailed in this article are many other APACE activities, such as the KASTOM Garden Project, which was aimed at reviving traditional agriculture. See also Robert Waddell, *Replanting the Banana Tree - A Study in Ecological Sustainable Development*, APACE 1993.

<sup>5</sup> World Bank, Pacific Regional Energy Assessments, *Solomon Islands: Issues and Options in the Energy Sector*, ESMAP Strategy and Programs Division, January 1992.

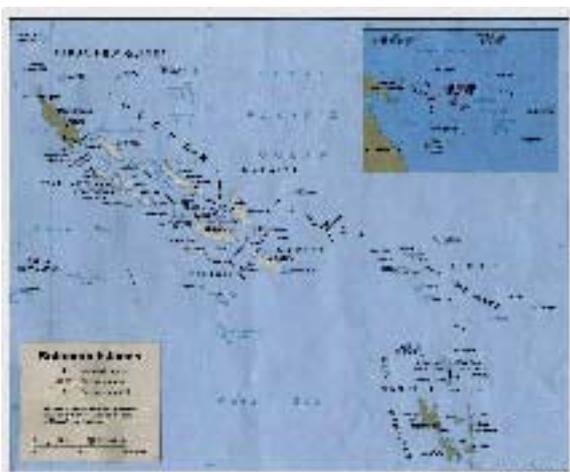
## APACE VFEG

### Appropriate Technology for Community and Environment – Village First Electrification Group

Started in 1976 as a charitable institution and recognised as an NGO by the Australian government in 1985, APACE operated as a predominately voluntary organisation. Some permanent local field staff were based in the Solomon Islands. The earliest APACE assisted micro-hydro scheme at Iriri, a village on Kolom Bangara Island in Western Province, was initiated by the local community during a crisis period in which international logging operations threatened their continued existence (and which continue to do so). The project was initially funded by UNIDO to test the viability of community-based energy projects. Established in 1983, the project was seen as a milestone in energy self-sufficiency for the isolated rural population, and was recognised nationally with a commemorative stamp. An APACE project field office was subsequently established in Gizo to support these grass-roots electrification initiatives in Western Province. These schemes have since caught the attention of neighbouring villages and of the national government, in addition to gaining considerable international recognition and accolades. APACE then became APACE VFEG under the International Programme Division of Earth Trust.

come to the community. Several training workshops have been organised specifically for village women in the Solomon Islands, and the participation of women in the Bulelavata micro-hydro project has been a valuable case-study for gender and energy in the Pacific.<sup>7</sup> Women were active participants in the construction teams, and the Bulelavata Womens' Committee runs the Village Hydro Management Committee.

<sup>7</sup> Donella Bryce & Chin Ching Soo, "Bulelavata Women Speak", *ENERGIA News*, Volume 6, Issue 2, January 2004.



Map of Solomon Islands

In addition to the reticulation of village lighting and power, electricity from the schemes is used for refrigeration to store fish, vegetables and pharmaceuticals. The scope for new village micro-enterprises can be significant, providing power for bread-making, small-scale carpentry and furniture workshops, battery charging, copra drying and other processing activities. Some villages are able to sell power to nearby government buildings, or business franchises and local agents.

In 1995 the Solomon Islands Government and APACE signed a Memorandum of Understanding whereby a national village electrification programme would be developed along the lines of Western Province micro-hydro projects. A national coordinating body, the Solomon Islands Village Electrification Council, was established in Honiara to develop guide-lines and criteria

on rural electrification policy. Gender objectives were to be included explicitly, and significantly the program was established as a rural development initiative rather than an electrification initiative.<sup>9</sup> The Solomon Islands now has a village-based resource of skilled female and male technical personnel. The success of these projects has culminated in a Melanesian-wide Village First Electrification Group.

Multilateral assistance programs promoting renewable energy in developing countries according to the market development path can leave more isolated regions neglected. Institutional capacity in micro-credit provision or technology markets may not be available to the recipients due to prohibitive transaction costs. For some Pacific Island countries the model does work, elsewhere it is simply not appropriate. The essence of the Solomon Islands success with these micro-

hydro projects is in their ethos of technology for community development. ■

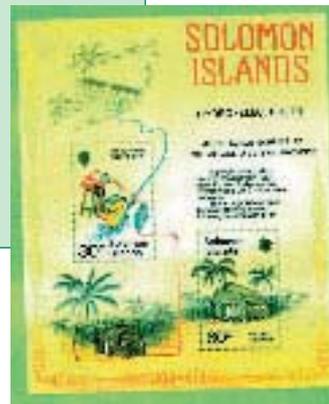


Figure 9. Stamp commemorating the Iriri project

<sup>9</sup> Nixon Silas Pio and Joini Tutua, "Village Power in Solomon Islands", *ENERGIA News*, Volume 6, Issue 2, January 2004.



Final stages in construction of a diversion weir in Vavanga

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# Conference Report: World Bank Energy Week

By Emmanuel Matsika, CEEZ (Zambia)

*World Bank Energy Week in Washington, DC from March 14-18, 2005 had as its theme "Our Energy Future." There were presentations by leading energy/development practitioners, exhibitions in the WB atrium, side events, and opportunities for participants to network with World Bank staff and with each other. The conference report below provides a summary of some of the key presentations and events, offers commentary on the discussions and meetings, and concludes with some thoughts regarding the outcome of the week's activities.*

It is widely recognised that ensuring affordable and reliable supplies of energy in developing countries is a prerequisite for economic development and poverty reduction in the coming century. The programme of the annual World Bank Energy Week (14-18 March, 2005) in Washington, DC was designed around the theme *Our Energy Future*, with the aim of defining key developments that will shape energy markets and services in the coming decades. There were a few keynote/special addresses, followed by plenary and parallel sessions. Themes for the four plenary sessions were:

- Petroleum and Sustainability
- Governance
- Energy and Environment
- Electricity Investment

The parallel sessions included four talks each, covering a wide range of topics. Overall, the week's presentations included both the traditional World Bank emphasis on large-scale energy projects as well as some less conventional presentations on small-scale renewable energy and energy for poverty reduction. A significant amount of time was set aside for discussion and the moderators generally did a good job of addressing and summarizing key points. The final two days of the week were devoted to

separate workshops, meetings, and side events – generally with much smaller groups.

There were over 700 participants, with about one-third being staff members of the World Bank Group. More than 30 developing countries were represented by senior policy makers, including the energy ministers of a number of African countries: Burkina Faso, Eritrea, Ghana, Malawi, Sierra Leone and Uganda. Developed country representatives included senior officials from development aid agencies, foreign ministries and NGOs. Also among the participants were many energy/development practitioners and project developers, and



*Wind power in Senegal*

representatives from many international firms with investments in developing country power projects.

## *Strategic issues*

Dr. Jamal Saghir, Director for Energy & Water and Chair of the Energy and Mining Sector Board of The World Bank gave an address entitled "Strategic Issues in the Energy Sector." He noted that the energy landscape is changing dramati-



*Workshop on Sustainable Bio-trade, a side event during the World Bank Energy Week, Washington D.C.*

cally with increased global energy demand driven by China, Brazil and India. He went on to highlight climate change and air quality as the key environmental drivers in the transition to cleaner, less carbon-intensive technologies. At the same time, poverty reduction requires affordable, reliable and sustainable sources of energy. The World Bank, through the Energy Sector Management Assistance Program (ESMAP) and the Global Village Energy Partnership (GVEP), has emphasised the important role of energy in reducing poverty.

Dr. Saghir summarised the key issues to be addressed during Energy Week. First, developing countries needed assistance with diversification strategies to cushion the shock of volatile and increasing oil prices. At the same time, petroleum industries need to be seen as contributing positively to development in the countries where they operate.

Second, increasing energy use and emissions due to rapid urbanisation in the developing world needed to be countered with policies to promote energy efficiency and renewable energy. However, policies appropriate for developed countries may not be appropriate for developing countries due to socioeconomic differences as well as institutional capacities and requirements. Through initiatives in developing carbon markets and financing renewables, the Bank has been providing leadership for new projects and programmes. He also noted the need for

greater adoption of economically efficient energy pricing strategies, including carbon taxes, removing “perverse” subsidies for fossil fuels, tradable emissions permits, and energy efficiency standards.

A third key issue was attracting appropriate investments. Together with some key private investors, the Bank has established joint working groups in areas such as governance and risk mitigation. Saghir also noted that scaling up modern energy access is much more than just an investment issue. For rural areas, it requires attracting a diversity of new players and building the technical capacity of local SMEs and financial institutions. For urban areas, expanding access involves transforming under-performing electric utilities into commercially viable entities. Strategies, policies and energy investments need to be coordinated within comprehensive development planning frameworks.

Fourth and finally, Saghir cited good governance as the key to ensuring the best possible use of resources, so as to achieve optimum level of service at least cost. Good governance embraces the quality of public decision making, successful implementation of the legal framework (to reduce corruption), and the process of consultation with accountability to stakeholders.

### *Global energy outlook*

The keynote address was given by Dr. Daniel Yergin, Chairman of Cambridge Energy Research Associates. He started by putting in perspective the global energy scenario. Notable was the change

in the world market for natural gas and oil. For the first time, oil consumption in Asia has exceeded that of North America: between 1994 and 2004, oil demand in Asia increased from 1.2m barrels/day in 1994 to 2.2m barrels/day last year, with most of this increase attributable to China and India.

In addition to growing demand in Asia, other factors that affect oil consumption and oil prices are the conflict in Iraq, international terrorism, and the stability of Russia’s Yukos Oil Company. The factors that are likely to influence oil security are the pace of technology advances in extraction, production, and distribution; changing geo-politics; and changes in the production capacities of the major oil producing countries.

Concerning Liquefied Natural Gas (LNG), Dr. Yergin observed that LNG was proving to be a more flexible and highly-traded commodity than previously expected. It was hoped that the long-term investment in LNG will interact with the short-lived US market.

Another factor that is influencing global energy scenarios is the growing number of nuclear power plants, as 20 have been built since 2000 and 28 are cur-

rently under construction. Such construction is continuing despite the social controversies surrounding the future of nuclear power.

For environmental concerns relating to coal, the role of new “clean coal” technologies employing carbon storage will have an increasing impact. In the transport sector, he noted that the use of hydrogen appears to be the main techno-



*Coal-fired power station in Zambia, no longer in operation*

logical focus for the long-term solutions.

During the discussion, the question was raised as to why the strategic oil reserves could not be used to reduce prices. Dr. Yergin noted that the oil reserves are designed to address “big events” rather than price fluctuations. In an event that oil prices rise significantly, only socially acceptable subsidies should be considered, but would need to be targeted carefully.

### *Petroleum and sustainability*

In the first plenary session, Mark Finley, Senior Economist with British Petroleum (BP), addressed the causes of rising oil prices and the issue of corporate revenue management. The increase in average oil prices during the past 10-15 years is attributable mainly to rising global demand. Spare capacity has reduced significantly due to speculative buying, geo-politics, OPEC policies, and perceived shortage of oil resources. These trends appear likely to continue.

Oil-exporting developing countries have the opportunity to have a fully financed development strategy. However, from the macroeconomic point of view, there is also a risk of “Dutch Disease”



*Modern energy carriers, electricity and LPG for sale in Nairobi, Kenya*



Photo: Pressensbild

*Gas offshore, flaring at an oil platform, Gabon, Africa*

(when natural resource development crowds out other important investments or areas of economic development). Other risks are fiscal sustainability and the lack of private investment in the non-oil sectors.

International oil companies such as BP can play a valuable role by facilitating good governance in the host country, engaging in socially responsible practices and activities, and facilitation of a reliable local supply chain. Oil development in Azerbaijan was cited as an example where BP rendered such a constructive role. On the research/analysis side, BP funds the Oxford Centre for the Analysis of Resource-rich Economies and the associated Chair in Economics at the University of Oxford.

Increasing oil demand is further complicating efforts at reducing GHG emissions, in spite of the ratification of the Kyoto Protocol. And in clarifying the definition of sustainability, a cautionary note was made to oil producers in that the finite nature of oil resources makes it risky for countries to become dependent on oil money.

### ***Petro-dollars and poverty reduction***

Ian Gary of Catholic Relief Services (CRS) gave a presentation on Africa's oil boom and the impact on the poor. The expected increases in oil production in countries such as Nigeria, Angola, and Chad would create a significant cash inflow in the region. Sub-Saharan oil pro-

duction is expected to increase from 3.4 to 6 million barrels per day between 2003 and 2010. This oil boom could produce a windfall of \$349 billion between 2002 - 2019, which could be used to increase social sector spending and reduce poverty.

In order to maximise the benefits of the oil boom, Africa needs to deal with the following challenges:

- Corruption, mismanagement, conflicts and worsening poverty
- Poor governance and human rights environment
- Secrecy in contracts, opaque revenue payments and government spending
- Weak government capacity to manage and allocate windfall
- "Dutch disease"
- Enclave economy - few linkages and few jobs produced
- Increased political instability and resource competition
- Local/regional inequities and grievance.

The example of Chad was given to show how the World Bank worked closely with the government to address many of the above challenges. Some key lessons from Chad include the following:

- Insecurity, weak judiciary and threats to democracy seriously jeopardise the prospects for poverty reduction
- Transparency alone does not guarantee accountability (other factors need to be considered)

- Need for spending capacity and job creation in the non-oil sectors
- Gaps in transparency must be addressed
- Loopholes exist in revenue management and regulatory systems.

In including transparency with Government, some participants felt there were risks associated with disclosure. However, it was noted that the long-term gain of transparency is expected to out-weigh such risks.

### ***Hybrid governance models***

Anton Eberhard, Director of the Infrastructure Industries Reform and Regulation Management Programme at the University of Cape Town (South Africa) spoke on the use of hybrid governance models for electricity regulation in Africa. In many countries, the power sector reform has either slowed or stopped due to lack of competitive electricity markets, with limited private participation. The most widespread reform is the creation of independent regulators, most of which regulate State-Owned Enterprises (SOEs).

Through the African Forum of Utility Regulators, key principles have been developed to form part of an initial framework for utility regulation in Africa. Regulation of SOEs is complicated by the difficulties associated with trying to separate government shareholding and regulatory functions. Most African regulators face much more challenging situations in terms of governance of SOEs, capacity building, lack of transparency and legitimacy, and institutional fragility.

A menu of 7 types of regulatory models was presented. It was observed that regulatory independence was desirable, but is not enough. An effective regulatory system needs "regulatory substance" as well as regulatory governance. It was suggested that a hybrid model, which can change with time, can be adopted by selecting from the menu of regulatory options. It was concluded that although regulators have a useful role in improving energy services, there is need for all stakeholders to be involved.

### Next steps for Kyoto

Yvo de Boer, Director of Environment in the Ministry of Environment of the Netherlands, outlined the way forward for the international climate regime, starting with the “good news” that the Kyoto Protocol entered into force at the beginning of 2005. However, the “bad news” is that the protocol will not lead to a downward trend in global emissions, mainly because of rising energy demand in developing countries and the fact that the Annex 1 countries (those with obligations to reduce emissions) are a relatively small group in terms of future energy demand and that energy demand will rise significantly over the coming decades.

It is projected that developing countries’ share of emissions will rise from 37% in 2002 to 48% in 2030. The main



*Biomass preparation for delivery to industrial customers, BETL, Tanzania*

challenges for climate mitigation can be summarised as follows:

- Sharper reductions must be made to achieve the ultimate objective of the Climate Convention
- A free-market approach with the broadest possible participation to minimise costs
- Reductions must be made economically and attractive, particularly to developing countries.

In order to achieve these goals three

key elements are suggested for a new regime, namely:

1. A clear international framework under the Climate Convention to set the targets, undertakings, instruments, flexibility and rules;
2. A clear national framework in all countries in the form of a national energy policy;
3. A concentrated use of financial, fiscal and administrative resources.

Such strategies will require significant investments in infrastructure. Unfortunately, analysis of investments in the energy sector shows a downward trend, which has been attributed to restructuring in the energy sector, difficulty in cost recovery, and higher risks. The presentation ended with a call for a structural energy dialogue, leading to an integrated approach of developing countries, international financing institutions, donor countries and the private sector. It also recommended incentives for low carbon-intensive technologies.

During the discussion, a number of issues arose. It was observed that Africa was unlikely to benefit from CDM due to the small size of projects. The participants were informed that the World Bank has developed programmes to consider small scale projects, while some Annex I countries are helping to finance CDM transaction costs. A US representative responded to a question about the US unwillingness to ratify the Kyoto Protocol by saying that although the US scientific community acknowledges the reality of climate change, the government does not see the Kyoto Protocol as an effective means to address increasing GHG emissions.



*Traditional wood/charcoal stove for institutional (small-commercial) use, South Africa*

### Portfolio-based electric power capacity planning

Shimon Awerbuch, Tyndall Centre, UK presented the framework of portfolio-based power planning, which he showed as more accurate in revealing how renewables impact overall generating cost and energy security.

Renewable Energy Technologies (RETs) can provide a portfolio of benefits that reduces the risk of higher energy prices without increasing cost, but the analyses done by lenders/investors generally do not capture such effects.

The price risk of fossil fuel was identified as a major external risk, due to its negative impact on employment and GDP. In the EU, oil spikes between 2000 and 2004 alone resulted in macro-economic costs of Euro 700 billion, an amount sufficient to offset the entire investment cost estimated by the European Wind Energy Association/European Renewable Energy Council (EWEA/EREC) to be needed to increase the share of renewables to 20% by 2020. While financial policy makers recognise the issue, energy policy makers often do not see the connection to renewables!

With respect to the power grid, renewables can help to re-conceptualise electricity and electricity service delivery paradigms. As the share of renewables increases, there will be some challenges regarding integration of renewables into the grid (due to their intermittency), and this will require some supporting systems. Overall, the advan-

tages of integrating renewables into the power sector include creation of sizeable portfolio benefits, reduction of risks and vulnerability, enhanced energy security, increased generating diversity, and opening up of new markets.

### *Sustainable bio-trade workshop*

The World Bank hosted a workshop on Sustainable Bio-trade on 17-18 March 2005 as a side-event of the annual Energy Week. The workshop was a joint event of two of the International Energy Agency's Tasks dealing with bioenergy: Task 40 and Task 29.

The goal of the work on global biomass trade is to analyse and evaluate market development, as biomass evolves into a real "commodity market" that can secure supply and demand in a sustainable way; sustainability is a key factor for long-term security. It is important to develop sustainability criteria to insure that trade in biomass maintains a standard that can assure long-term productivity and offers sustained value of global biomass resources to producers and consumers.

Speakers and participants included representatives from research institutes, consultancies, NGOs, energy companies, government agencies, the World Bank and other international organisations. The presentations summarised the results of a number of bioenergy projects and programmes, as well as global studies and regional policy analyses. The focus

of discussion at the workshop was on how to provide useful sustainability assessments of biomass markets in terms of the socio-economic and environmental impacts. Another workshop will be held in Brazil towards the end of 2005.

### *Conclusions*

World Bank Energy Week 2005 and side events such as the Sustainable Bio-trade workshop addressed the role of energy in supporting development, reducing poverty and meeting the MDGs. The key challenges include stimulating investment, expanding capacity-building, creating workable legal frameworks and providing effective governance. Climate change and local/regional air quality will continue to be the main environmental drivers.

Developing countries can take advantage of natural resource endowments to promote renewable energy sources. Expanded production and use of biofuels, particularly ethanol and biodiesel, can reduce the impacts of rising oil prices.

Portfolio analysis is a methodology that shows clearly some of the economic advantages of integrating renewables into the power sector through diversification, enhanced energy security, and opening up of markets.

A strong message, which consistently came out of many presentations, is the need to eliminate corruption, as it slows down energy sector reforms and drains away resources that are urgently needed.

Even where indigenous energy resources are widely available, there is a significant need for transparency, accountability, and efforts to achieve consensus among all stakeholders, especially in the local communities.

For more info:

- World Bank Energy Week:  
[www.worldbank.org/energy/energyweek2005/](http://www.worldbank.org/energy/energyweek2005/)
- IEA Task 40: Sustainable Bio-energy Trade.  
[www.fairbiotrade.org/](http://www.fairbiotrade.org/)
- IEA Bioenergy Task 29: Socio-Economic Drivers in Implementing Bioenergy Projects  
[www.iea-bioenergy-task29.hr/](http://www.iea-bioenergy-task29.hr/)

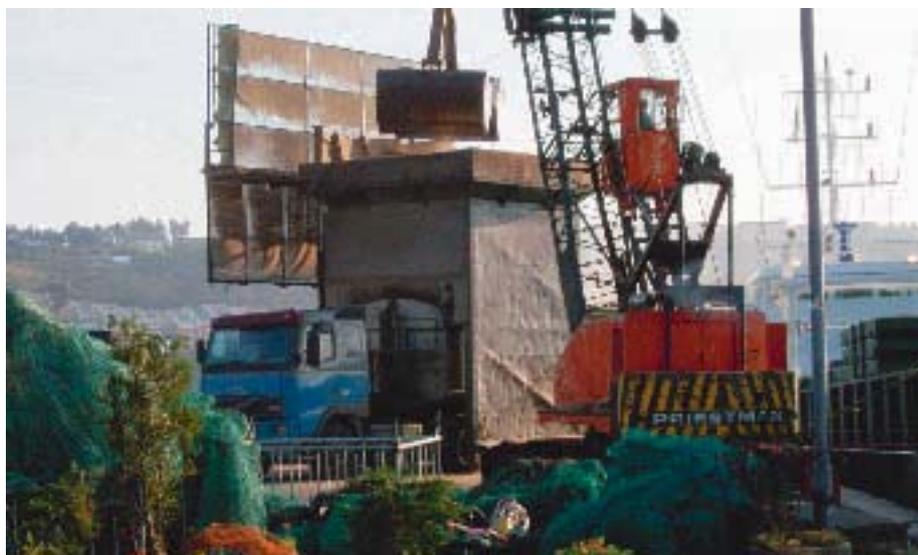
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### *Acknowledgement:*

Emmanuel Matsika participated in World Bank Energy Week in cooperation with Stockholm Environment Institute and with partial support from the Swedish International Development Cooperation Agency (Sida). ■



*International trade in biomass and biofuels can use existing shipping routes and equipment, such as this tanker, which is off-loading grain to trucks for distribution in Kinsale, Ireland*

# Promotion of Energy Efficiency and Conservation in ASEAN: from Regulations to Market-Driven Solutions

by Francis KH Chin, Pierre Cazelles, and Kamol Tanpipat (EEC Energetics, Thailand)

*Governments of the Association of Southeast Asian Nations (ASEAN) are currently promoting energy efficiency and energy conservation through the adoption of a regional market-driven tool: the ASEAN Energy Manager Accreditation Scheme (AEMAS), which is expected to be implemented in early 2006. This scheme takes a business-oriented systematic approach in aiming to achieve best-practice, environmentally sustainable energy management.*

The ASEAN Energy Manager Accreditation Scheme (AEMAS) is a comprehensive and significant programme in the area of energy management for several reasons. First, it is the first accreditation scheme for energy professionals that focuses on the managerial and business aspects of energy management: the AEMAS takes a long-term and sustainable approach to promoting energy efficiency. Second, it also includes certification of energy end-users to recognize their energy performance: the AEMAS takes a dual approach by targeting both individuals and organizations. Third, the AEMAS is a regional initiative, the first of its kind worldwide, and could offer a useful model for replication and expansion in other parts of the world.

## *ASEAN Trends in EE&C policies*

ASEAN member countries are at different stages of development with respect to implementation of energy efficiency and conservation (EE&C) programmes and policies. The existing policies and regulations on EE&C in ASEAN countries have achieved some success and have demonstrated that the market is, in some countries at least, ready to take up the lead in implementing EE&C measures beyond national regulations. However, even in those

cases where businesses understand the benefits of EE&C measures, they are generally not yet proactive, and therefore there is a public interest in government regulations and incentives that stimulate cost-effective EE&C measures.

Thailand has been one of the most active countries in promoting EE&C in the ASEAN region. Following the enactment of the Energy Conservation Promotion Act in 1992, it established an energy conservation fund. Thailand has adopted proactive policies and regulations to encourage medium-to-large energy end-users (those with more than 1MW electrical demand per annum or 20 TJ of annual energy consumption) to implement a three-year energy savings plan. The Training programme for “Persons Responsible for Energy” is compulsory and subsidized by the government. Malaysia and Singapore rely more on the market response as opposed to government regulations, and offer certified training courses for energy managers. In the 1980s, Philippines was the leading ASEAN country in the field of EE&C, but has lost momentum since then, although the government has recently restated its commitment to further promote EE&C. Vietnam has adopted its Master Plan for Energy Conservation and recently enacted its Energy Efficiency Decree.



*The 10 nations in the ASEAN group*

National schemes established by ASEAN member countries focus mainly on technical aspects of energy management with not enough attention given to the managerial and business aspects. By proposing managerial and business skills development, the AEMAS is designed to complement the efforts of ASEAN member countries. Furthermore, AEMAS also attempts to attract the best senior managers of corporations by elevating the social, economic and professional standings of energy managers in the ASEAN region.

## *The ASEAN Energy Manager Accreditation Scheme (AEMAS)*

The ASEAN Energy Manager Accreditation Scheme is one of the priorities of the ASEAN Plan of Action for Energy Cooperation 2004-2009. It is currently being designed by EEC Energetics (Thailand) within the framework of a feasibility study sponsored by the European Commission and the ASEAN through the

EC-ASEAN Energy Facility. The AEMAS will offer training and accreditation opportunities for energy professionals, as well as energy management guidelines and certification opportunities for energy end-users.

This scheme is strongly supported by all ASEAN governments. AEMAS is a scheme that will support governments' policies and help shift the market approach to energy efficiency from reactive to proactive, and thereby move energy management schemes towards best practices. It can also act as a stand-alone market-driven scheme in countries without regulations on EE&C.

### Corporate status of energy management

Energy management activities still tend to rank low in business priorities. With the exception of a few energy-intensive industries, little attention is given to energy performance by most top executives, since energy usually represents no more than 5% of total production costs. Most executives tend to overlook the fact that energy savings can translate into direct business profits that will continue year-after-year! As a result, there is often no real corporate energy management

policy, and activities are mainly focused on improving housekeeping and implementing technology-based projects.

Nor do many corporations have a long-term vision for sustainability, which would address economic and environmental issues simultaneously and in a more creative way. A more structured business-oriented approach could continuously improve the system so as to "lock in" the savings and move progressively towards energy management best practices (see the Figure 1). Implementing such a sustainable energy management system requires a highly qualified energy manager with strong managerial and business skills, supported by a technical team - either in-house or outsourced - and also requires boardroom support.

The ASEAN Energy Manager Accreditation Scheme will offer managerial and business training courses to qualified energy professionals in sustainable energy management. In parallel, energy management guidelines are being developed to provide energy end-users with a comprehensive and practical roadmap to establish and implement a sustainable energy management system.

The design of AEMAS is an example of successful regional cooperation and it follows a consultative approach. A Project

Steering Committee, composed of the ASEAN Energy Efficiency & Conservation Sub-Sector Network, gives advice to the project team and makes sure that the scheme fits with ASEAN governments' policies, regulations and programs on energy efficiency. Regional workshops have been organized in Thailand, Philippines and Malaysia during 2005 to consult with key stakeholders including academia, energy professionals, energy end-user representatives, and government agencies. This consultation approach is valuable to the design of a regional scheme that cannot only address the needs of energy professionals and energy end-users, but also complement policies and programs implemented by ASEAN member governments.

The ASEAN Energy Manager Accreditation Scheme will become one of the key schemes to implement regional cooperation actions in the field of energy in ASEAN. It is strongly supported by each ASEAN member country, the UN-Economic and Social Commission for Asia-Pacific (UN-ESCAP) and by the Asian Development Bank. It is expected that the ASEAN Energy Manager Accreditation Scheme will become operational in early 2006.

The ASEAN Energy Efficiency & Conservation Sub-Sector Network (EE&C SSN) is comprised of representatives from ASEAN member state government agencies responsible for energy demand. ■

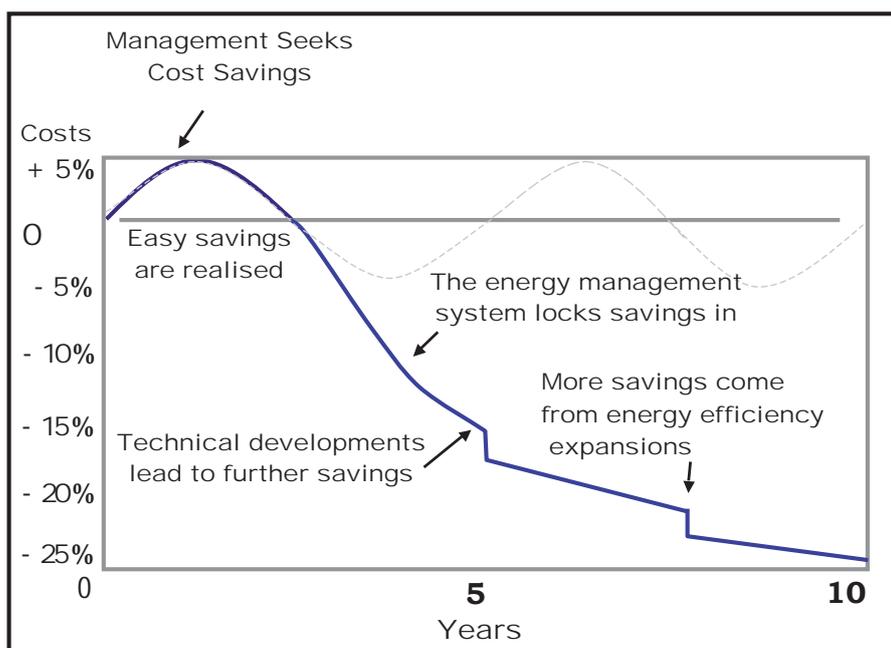


Figure 1: "Lock-in" of savings occurs through managerial learning, new technical developments, and progressive implementation

#### For more info:

**ASEAN Energy Manager Accreditation Scheme (AEMAS):** [www.aseanemas.org](http://www.aseanemas.org)  
[www.aseanenergy.org/energy\\_organisations/eec\\_ssn/eec\\_ssn.htm](http://www.aseanenergy.org/energy_organisations/eec_ssn/eec_ssn.htm)

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# The Role of Energy in Meeting the MDGs and the Scale of the Challenge

by Anders Arvidson and Mattias Nordström, SEI

*Prior to the 2005 UN World Summit, Stockholm Environment Institute was tasked by the Government of Sweden to shed some light on the question of how the MDGs could be met using sustainable development approaches. The report “Sustainable Pathways to Attain the Millennium Development Goals – Assessing the Role of Water, Energy and Sanitation”, was prepared by an SEI team that highlights the importance of the environment in achieving all the MDGs. The following is a short summary of the main findings of the study on “Energy for poverty reduction”.*

Reaching the poor, their communities and social service institutions with basic levels of modern cooking fuels, electricity and mechanical power is a prerequisite for reaching all of the MDGs. This will require a substantially accelerated delivery of energy service to the poor people of the world, yet amounting only to 900 TWh annually, at a cost of about 45 Billion USD.

In a global perspective, the amount of energy needed is less than 1% of the global commercial energy demand in 2015. It will have positive environmental impacts at all levels, the household, local, regional and global level. Replacing traditional solid fuels used for cooking and heating will have positive environmental impacts at the household level, where up to 1.6 million deaths annually can be spared. At the local and regional level, cadmium releases to the atmosphere, emissions causing acidification and particulate matter causing haze and smog will be avoided. At a global level, even if petroleum based, gaseous and liquid fuels replacing traditional solid fuels for cooking

will contribute to reduced greenhouse gas emissions.

Adverse environmental impacts of the increasing energy consumption world wide due to growing economies and rising affluence including pollution and climate change, however, has serious negative consequences on the ability of the poor to move out of poverty. Climate change in particular threatens to disrupt the food production systems, and the poor are also the most vulnerable to adverse climatic effects such as floods and droughts. While expanding and widening energy service access, it is crucial to increase energy efficiency and reduce emissions world wide. In light of the negligible increase in global commercial energy supply needed to meet the MDGs, the by far most effective way to address global climate change will be interventions where the

large emissions occur. Achieving the MDGs is thus a truly global responsibility and needs to be addressed by accelerated investments in delivery of energy services to the poor along with strengthening of institutions to absorb and make use of investments compatible with MDG achievement. At the same time, developed countries should focus research and investments into energy efficiency and development and dissemination of renewable energy technologies.

To read more about this please see the report: “Sustainable Pathways to Attain the Millennium Development Goals – Assessing the Role of Water, Energy and Sanitation” published by SEI for the 2005 UN World Summit, which is downloadable from [www.sei.se](http://www.sei.se) ■

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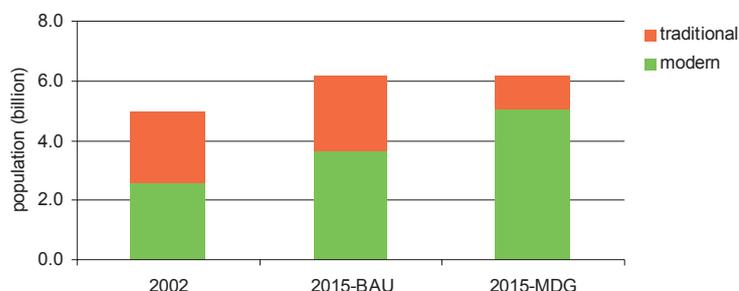


Figure 1. The cooking fuel challenge (BAU=Business-as-usual scenario)  
Source: Own calculations based on statistics and reports from UN, FAO and IEA.

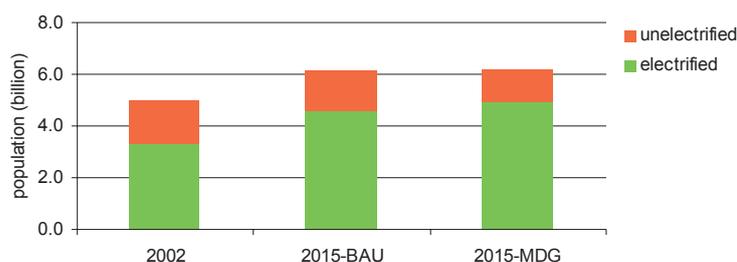


Figure 2. The electrification challenge (BAU=Business-as-usual scenario)  
Source: Own calculations based on statistics and reports from UN, FAO and IEA.