

- 03 **SMALL ISLANDS**
Sustainable energy initiative
- 16 **ECOLOGICAL DEBT**
Fair solutions to global warming
- 22 **LAO PDR**
Sustainable village energy



03 Energy for small islands

Tom Roper outlines a global initiative aimed at supporting renewable energy and energy efficient projects as well as national energy plans in small island states.

09 Equity in climate change

Janica Lane, Ambuj Sagar and Stephen Schneider discuss the equity implications of climate change impacts and policy.

16 The ecological debt crisis

Andrew Simms describes the ecological debt crisis, best demonstrated by global warming.

22 Sustainable village energy

Adam Harvey describes a successful programme designed to provide sustainable forms of energy to villages in Lao PDR.

15 News

20 Conferences

Cover photo: Water distribution, Gujarat, India
Alexandra Clemett



St Lucia: The Pitons from a land view

Photo: Dr Anthony R Picciolo, NOAA NODC

Energy for small islands

Tom Roper outlines a global initiative aimed at supporting renewable energy and energy efficient projects as well as national energy plans in small island states

The forty-three members of the Alliance of Small Island States (AOSIS) are among the most vulnerable to global climate change with its accompanying sea level rise and increased extreme weather events.

Most Small Island Developing States are already ill-equipped to deal with their existing environmental problems, such as coastal and coral degradation, explosive population growth, over development and pollution. These problems will worsen as the impacts of land submergence, beach erosion, coral damage and storms take their toll.

Climate change threatens the very existence of many AOSIS members even though they are the innocent, being the smallest emitters of greenhouse gases. Nations such as the Maldives, Tuvalu and Kiribati are just a few metres above sea level.

Compounding the challenge of global warming, most Small Island Developing

States struggle with expensive and sometimes unreliable fossil fuel imports. Diesel is the dominant source of electricity, at least for those with it, and can cost as much as US\$40 cents/kWh. Seventy per cent of Pacific Islanders, however, still do not have access to electricity.

Fortunately, though, the need for change has coincided with the greater affordability and availability of alternatives to fossil fuel. The cost of renewable energy has come down dramatically. Small Island Developing States are especially suited to utilize combinations

MAIN POINTS

- **Tom Roper** describes a new initiative which promotes energy efficiency and renewable energy for small islands states.
- **The project** helps bring appropriate

projects into national sustainable energy plans.

- **The initiative** has started in the Caribbean but hopes to expand to other areas.

of modern renewable energy technologies and energy efficiency measures.

Finding an international solution

Some years ago, Ambassador Slade challenged the Climate Institute, a Washington DC-based non-governmental organization, to work with AOSIS to find energy solutions.

As a result, the Global Sustainable Energy Islands Initiative (GSEII) has been organized to support Small Island Developing States and potential private investors and donors by bringing renewable energy and energy efficiency projects, models and concepts together into national sustainable energy plans. The GSEII, a consortium of international non-governmental organizations and multilateral institutions, seeks to showcase national efforts that significantly reduce greenhouse gas emissions.

The GSEII was launched with a grant from the Rockefeller Brothers Fund. This grant ena-

THE GSEII CONSORTIUM

• **The Climate Institute** is a non-profit organization founded in 1986 to serve as a bridge between policy makers and scientists around the world, as well as between developed and developing nations. The Institute promotes cooperative international action to address climate change. Contact: nkhattak@climate.org

• **Counterpart International**, set up in 1965 as the Foundation for the Peoples of the South Pacific, is involved in the successful rural energy programme in Kiribati. It works with island communities in the areas of capacity building, sustainable energy, climate change, biodiversity, marine resource management and environmental protection. Contact: info@counterpart.org

• **The Energy and Security Group** assists clients to ad-

dress critical energy and natural resources issues at the nexus of national and international security interests. The Group promotes the use of environmentally-responsible energy solutions through the following business services: energy security analysis; project support; financial engineering; policy support; and technical assistance and training. Contact: judy@energyandsecurity.com

• **The International Network for Sustainable Energy** (INFORSE) is a European-based global network of independent non-governmental organizations working for sustainable energy solutions to reduce poverty and protect the environment. INFORSE is a worldwide network consisting of over 140 non-governmental organizations working in over 60 countries. Contact: ove@inforse.org

• **The Organization of American States** is a multilateral organization for the nations of the Americas and currently serves as the coordinating institution for the Renewable Energy in the Americas initiative, which offers technical, policy and financial assistance for the promotion of sound energy solutions. Contact: lambrides@oas.org

• **Winrock International** is a non-governmental organization working with people around the world to increase economic opportunity, sustain natural resources and protect the environment. Winrock's Clean Energy Group is a recognized leader in the field of clean energy and operates a multimillion dollar programme, including Renewable Energy Project Support Offices in ten countries. Contact: jpg@winrock.org

bled the consortium to initiate sustainable energy plans and policies as well as communications and outreach in three Caribbean countries – St Lucia, Grenada and Dominica – as well as other AOSIS nations. The United States Department of Energy and the Turner

Foundation were also initial supporters of GSEII.

The United Nations Foundation has enabled the consortium to advance projects in these three island nations as well as to expand activities to other island nations within the

Caribbean and the Pacific. This grant will also help in identifying and developing financing for replication in the region. The United Nations Industrial Development Organization is the executing agency and partner.

More recently, the consortium has also received support from two new funders – the United States Agency for International Development and the Renewable Energy and Energy Efficiency Partnership.

The Organization of American States, a consortium member, has also obtained support from the Global Environment Fund and the United Nations Development Programme to develop a pre-feasibility study for geothermal resource assessment in Dominica, St Lucia and St Kitts and Nevis.

The GSEII strategy

To accelerate the transition of AOSIS member nations toward cleaner, more sustainable energy use, the GSEII employs the following approach to both broaden and deepen sustainable energy development activities:

- work with partner countries on the development and implementation of Sustainable Energy Plans, with quantifiable targets and timetables;
- identify and mitigate policy, financing, technical and institutional obstacles and bring about changes in the marketplace that will enhance the viability, profile and replicability of clean energy projects;
- work with utilities to enhance their capacity for renewable energy planning and



Photo: © GSEII

- help transform these utilities from diesel-based generation to renewable energy systems;
- catalyze private investment in renewable energy (such as biomass, geothermal, hydropower, photovoltaics, solar thermal and wind technologies) and energy efficiency opportunities;
- build and strengthen local capacity at national and regional levels to continue to develop and implement sustainable energy options and approaches; and,

- demonstrate that energy can be used as a tool for sustainable development and poverty reduction, thereby helping to meet the Millennium Development Goals.

The challenge

Small Island Developing States are especially suited to utilize combinations of modern renewable technologies and energy efficiency due to the availability of renewable energy resources and current energy consumption patterns. But there are difficulties in achieving this potential.

Most Small Island Developing States lack technical knowledge and skilled personnel, and there are still too few successful demonstration projects that can be seen and touched. Utilities depend on diesel, and their staff have little or no experience of renewables or access to resource assessments. The

Maldives, for instance, at the time of initiating plans, had no engineer with renewable energy expertise. In addition, renewables often have a high upfront cost, while utilities suffer from a scarcity of finance.

The Cabinet of the beautiful Caribbean nation of St Lucia was the first to approach GSEII for assistance. Working with the government, utility, business and the community, a comprehensive energy plan has been prepared and adopted by the Cabinet. The aim is to have renewables account for new capacity, replace outdated diesels and encourage energy efficiency.

Dominica and Grenada have joined the project and jointly announced their ambitious targets at the World Summit in Johannesburg.

Dominica's former Prime Minister, the late Pierre Charles, said "my country, known as

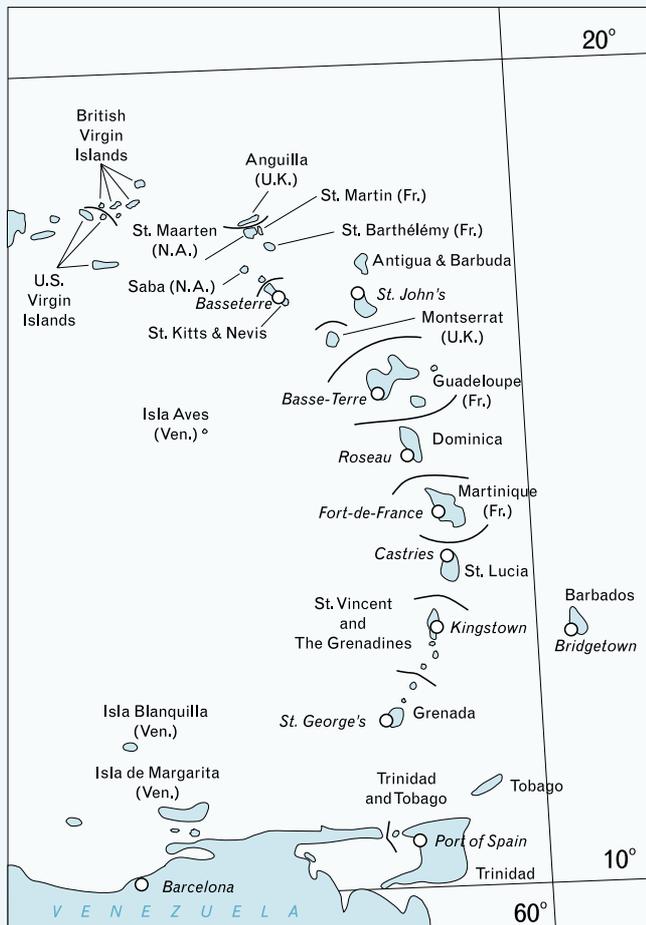
REQUIREMENTS FOR DEVELOPING NATIONAL SUSTAINABLE ENERGY

- Set up a National Working Group on Sustainable Energy
- Adopt targets for energy transformation
- Carry out resource assessments
- Identify renewable energy and energy efficiency projects
- Remove barriers, including legislative barriers, to commercialization
- Obtain approval and involvement by the Government and other stakeholders

Success will require capacity building, community education and awareness campaigns, and the sharing of experiences with other regions and islands. It will also need hitherto scarce donor, international bank and private sector investment.

If success is not achieved, there is a real risk that most Small Island Developing States will miss out on opportunities for the sale of carbon offset credits through the Clean Development Mechanism.

EASTERN CARIBBEAN



the Nature Island of the Caribbean, has long embraced the principles of sustainable development and sees clean energy as a fundamental requirement for economic and social progress.” The national target, building on existing 33 per cent use of hydropower, aims to achieve 65 per cent renewable energy use by 2010.

“Our dependence on expensive foreign energy has done nothing to help development or deliver affordable energy to the poor. Small Island States need support from developed nations to succeed in their energy plans – technical assistance, new technologies, soft financing and joint venture partners,” he added.

The GSEII five-year sustainable energy plan

As a result of assessing the immediate energy needs of the small islands, the GSEII developed an ambitious five-year plan.

The fundamental aims of the plan are to assist several Small Island Developing States that are members of AOSIS in achieving energy independence and thus to serve as successful models for the rest of the world.

The GSEII’s strategies and plans run from 2003 to 2008. It is expected that the following outcomes will be achieved as a result of implementing this five-year plan:

- approved National Sustainable Energy Action Plans in over twelve Small Island Developing States;
- enhanced capacity for national energy

ONGOING PROJECTS AND PROJECTS TO BE IMPLEMENTED 2004–7

- planning and renewable energy/energy efficiency policy implementation;
- commitment and/or leverage of US\$100 million in investment in renewable energy/energy efficiency projects and enterprises;
- initiation of energy efficient projects in government facilities, and commercial, residential and industrial sectors, especially in the hotels and tourism industry;
- initiation of fifteen new projects in AOSIS member nations and plans for at least 100 MW of clean energy projects (new and renewable energy projects or equivalent savings through efficiency measures) facilitated with corresponding greenhouse gas emissions reductions;
- enhanced capacity for renewable energy and efficiency at a regional level and among all 43 members of AOSIS; and,
- catalyzing the interest of other bigger nations to follow the Small Island Developing States example.

Initial successes

The Fiji Department of Energy has, amongst other initiatives, developed a village-based hybrid wind, solar and diesel scheme, and provides mini hydro and coconut oil options elsewhere. The Fiji Electricity Authority is negotiating for a major wind power investment to service the grid.

Encouraged and assisted by the Pacific Power Association, the ocean-wide regional electric utilities organization, five Pacific nations and the European Union are final-

St Lucia	<ul style="list-style-type: none"> St Lucia Electricity Services Point de Caille 4.25 MW Wind Farm St Lucia Cooperatives League and Credit Unions Solar Hot Water Heating Financing Program St Lucia Ciceron Landfill Gas to Energy Project Poultry Litter to Energy Project Sulphur Springs Geothermal Project Energy Efficient Lighting Project Energy Audits and Training Project for Hotel Industry Energy Efficiency and Renewables Awareness Campaign
Grenada	<ul style="list-style-type: none"> 225 kW Wind Turbine on Carriacou island Grenada Nutmeg Shell to Energy Project Grenada Cooperatives League and Credit Unions Solar Hot Water Heating Financing Program Energy Efficient Lighting Project Photovoltaic system for Grenada Chocolate Company energy supply
Dominica	<ul style="list-style-type: none"> Large Scale Geothermal Project Pre-feasibility Development Energy and Power Losses Reduction in Dominica Electricity Services Distribution System Dominica Cooperatives League and Credit Unions Solar Hot Water Heating Financing Program Pilot Phase for a potential 4 MW Wind Farm Dominica Electricity Services Micro Hydro Project Energy Efficiency Lighting Project

izing individual country sustainable energy projects. Elsewhere, the Unit for Sustainable Development and Environment of the Organization of American States is executing a Global Environment Facility project to support geothermal energy development in the Eastern Caribbean.

The Eastern Caribbean Geothermal Development Project (Geo-Caribbean) seeks to catalyze commercial geothermal energy projects

in St Lucia, Dominica and St Kitts and Nevis with the expectation that regional power independence will contribute significantly to the economic and environmental sustainability in the region.

Geo-Caribbean intends to achieve this goal by supporting market reforms that improve the market conditions for geothermal power in these countries. The following are the main avenues of support:

- establishing a transparent pro-active and commercially-sound geothermal policy and legal environment;
- furthering geothermal resource/technical studies for commercial investment pre-selection;
- conducting the technical evaluation and establishing the institutional arrangements for the export of geothermal power to Martinique and/or Guadeloupe;
- creating a US\$10 million Eastern Caribbean Geothermal Energy Drilling Risk Fund; and,
- organizing a process to attract/negotiate with world class geothermal project developers to invest in projects.

It is expected that a large quantity of geothermal energy capacity (60–120MW) will be developed and that the resulting power will offer the host countries a low-cost power solution. At the same time, this will enable them to generate substantial income from exports to Martinique and/or Guadeloupe via submarine electricity transmission cables.

In St Lucia, Grenada and Dominica, the GSEII has assisted in developing National Sustainable Energy Plans as well as preparing projects for investment. As a result of these plans, and working closely with the local utilities and private sector entrepreneurs, a number of projects have been identified. GSEII and its partners are providing technical assistance in further development and implementation of these projects.

GSEII will also work with local governments and project developers on the development and packaging of projects for carbon financing through the Clean Development Mechanism, the Prototype Carbon Fund and other sources.

These efforts will be coordinated by the GSEII by working closely with existing regional organizations and multilateral initiatives. These include the Caribbean Renewable Energy Development Programme, the Organization of Eastern Caribbean States, the Caribbean Energy Information Systems, the United Nations Development Programme and the Global Environment Facility.

In conclusion

The GSEII partners aim to continue their Caribbean work, possibly adding additional nations, and help develop sustainable energy plans for Pacific and Indian Ocean countries. The United Nations-sponsored review meeting of the 1994 Barbados Plan of Action held in January 2005 in Mauritius provided an excellent opportunity for the showcasing of successful demonstration projects.

We must show the international community that sustainable energy is not only an environmental necessity, but also makes economic and social sense. ■

ABOUT THE AUTHOR



● **Tom Roper** is project director of the Global Sustainable Energy Island Initiative and is also a board member of the Washington DC-based Climate Institute.

CONTACT

● **Tom Roper**, Climate Institute, 1785 Massachusetts Avenue NW, Washington DC 20036, USA.

Fax: +1-202-5470111

Web: www.climate.org

Email: troper@nyc.rr.com

FURTHER INFORMATION

● **On the Web:** The GSEII website can be found at www.oas.org/reia/GSEII/GSEII.htm. Further information concerning the review of progress in implementing the Barbados Programme of Action for the Sustainable Development of Small Island Developing States can be found at the conference website at www.un.org/smallislands2005/.

● **In the Cyberlibrary:** The Tiempo Climate Cyberlibrary presents. Developing States at www.tiempocyberclimate.org/floor0/theme/t3637web.htm and on alternative energy at www.tiempocyberclimate.org/floor0/theme/t3839web.htm.

ACKNOWLEDGEMENTS

● Parts of this feature have been extracted from an article by the author in *New Academy Review*.

Equity in climate change

Janica Lane, Ambuj Sagar and Stephen Schneider discuss the equity implications of climate change impacts and policy

Future climate change impacts may be significant, affecting people globally. Impacts, however, are likely to disproportionately harm developing nations, which contain roughly 80 per cent of the world's population. These nations have contributed little to cumulative greenhouse gas (GHG) emissions (about 20 per cent of the global total to the year 2000). Compounding this inequity, most cost-benefit analyses (CBAs) inaccurately represent the extent of climate-change-induced damages in these countries. CBAs typically assess damages easily quantified in monetary terms, while ignoring issues such as distributional inequity and the value of nature or quality of life. We therefore propose a system that better evaluates market-system impacts and incorporates non-market impacts for a more equitable, accurate approach to damage assessment. We discuss the need to help developing countries and marginalized people

adapt to climate change but stress that industrialized nations must also reduce GHG emissions. Mitigation, in both developed and developing countries, is necessary to relieve pressure on the climate system.

Climate change impacts

In its Third Assessment Report in 2001, the Intergovernmental Panel on Climate Change

MAIN POINTS

- **The authors describe** the injustice of traditional cost benefit analyses of climate change impacts and propose a more equitable system for assessing climate damages.
- **They discuss** the need to help developing countries and

marginalized people adapt to climate change.

- **They stress** that industrialized nations must lead on both this and emissions reduction, but that mitigation in developing countries is also necessary.

(IPCC) projected that by 2100, the planet would warm by between 1.4° and 5.8°C. Warming at the low end of this range would be less stressful, but still significant for some systems. Warming at the higher end of the range could have widespread catastrophic consequences that many would consider 'dangerous'.

Based on these temperature forecasts, the IPCC listed likely climate change impacts, including: more frequent heat waves and less frequent cold spells; bigger storms and more weather-related damage; more intense floods and droughts (with droughts expected mostly in mid-latitude inner-continent regions); faster disease transmission; less farming productivity, especially in hotter places, and movement of farming to other regions (mostly to higher latitudes); rising sea levels, which could inundate coastal areas and small island nations; and species extinction and biodiversity loss. Global average surface

temperatures have increased by 0.7°C since the mid-1800s, and some of these projected impacts are already occurring. For example, rainfall in mid- to high-latitude regions in the Northern Hemisphere has increased, and the behaviour of certain plants and animals has changed in response to climate change.

“Temperatures have increased by 0.7°C since the mid-1800s, and some ... projected impacts are already occurring”

Links between climate change and other impacts are suspected but have yet to be statistically proven.

The IPCC also suggested that climate change could trigger ‘surprises’. These are fast, non-linear climate responses, thought to occur when environmental thresholds are crossed and new potentially harmful equilibriums are reached. Some of these surprises could be anticipated, but others may be truly unexpected. Such surprises are likely with climate change because of the complexities of the processes and interrelationships involved (for example between oceanic, atmospheric and terrestrial systems) and our insufficient understanding of them individually and collectively.

The developed versus developing country divide

There are three main questions to ask when examining regional climate change impacts:

- 1) Have a country/region’s climate change damages been fairly assessed, and if not, how do we do this?
- 2) What is the country/region’s capacity for coping with climate change?
- 3) How do we allocate responsibility for causing the problem, and therefore for paying

for responses to it?

The greatest attention should be given to those who will suffer the greatest impacts from climate change, have the lowest capacity to cope with damages, and have contributed least to the problem. The need for resources to build appropriate capacity in developing countries to minimize damages, and the allocation of this burden among industrialized countries, must also be re-emphasized.

Damage assessment

In order to better measure climate damages, Stephen Schneider and others proposed five alternative measures in a 2000 article in the Pacific and Asian Journal of Energy called “costing nonlinearities, surprises, and irreversible events”. These are: conventional market system costs in dollars per ton of carbon; human lives lost per ton of carbon; species lost per ton of carbon; distributional effects in changes in income differentials between

rich and poor per ton of carbon; and quality of life changes, such as heritage sites lost or refugees created per ton of carbon. Considering such factors provides a more accurate assessment of climate change damages than conventional market damage oriented CBAs. In addition to the absolute costs in each of the five categories, we propose that relative costs should also be considered in some categories. For example, we should consider market-system costs relative to a country’s Gross Domestic Product (GDP), or species lost relative to the total number of species in that family. This will better account for potential damages and could help merge the often disparate values of different groups in gauging damage seriousness. In other cases, such as human lives lost, the absolute measure remains more appropriate.

Traditional CBAs, which many economists use, usually consider a sole measure (market values) to assess damages. Market values, however, rarely capture the full costs of climate impacts. For example, under a traditional CBA, an industrialized country with a large economy that suffered the same climate damages as a less-industrialized nation with a less robust economy would be viewed as suffering more (due to its larger absolute dollar loss) and would be more important to ‘rescue’. Even more problematic, CBAs often ignore distributional issues. For example, what if an industrialized country experienced a monetary gain from global warming due to longer growing seasons and

other factors, while poor countries suffered a monetary loss equivalent to that gained in the industrialized country? This is not a 'neutral' outcome for human well being, despite the zero net change in monetary welfare. It is also difficult to assign monetary values to non-market damage categories (such as reduced human life quality), but this does not mean these damages should be ignored. Using multiple measures helps focus on 'soft' issues that might be ignored under traditional CBAs.

Under the five measures, developing countries interests have more weighting as threats to non-market entities are counted. For example, if rising sea levels in Bangladesh cause losses equivalent to about 80 per cent of national GDP, these losses would be catastrophic for Bangladesh but would only be 0.1 per cent of global GDP. A market-aggregation-only analysis would classify the damage as relatively insignificant. Those considering multiple measures, however, would say this is unfair, given the severity of the aggregate market impacts in relation to GDP, in addition to loss of life, degraded quality of life and potential biodiversity loss.

Coping capacity

There is an imbalance between rich and poor nations' abilities to cope with climate change impacts. National GHG emission levels are highly correlated with wealth. Wealthier societies also have the institutional infrastructure needed to build adaptive and mitigative

capacities. Thus, richer countries, that have typically contributed most to global emissions, can usually cope better with climate change impacts. Poorer countries and poorer groups within countries have lower adaptive capacities due to financial, technological, and institutional constraints. The need to develop adaptation capacity in vulnerable countries is magnified by the possibility that many such countries may face particularly severe impacts. It will be difficult enough for these countries to cope with gradually occurring climate change, but 'surprises' could be devastating in both an absolute and relative (to developed nations) sense. As evidenced by the high costs (in lives, fraction of GDP, quality of life etc.) paid by developing countries when disasters such as cyclones occur, these countries are poorly equipped to deal with catastrophes. Within poor nations, the most marginalized groups (including small-scale subsistence farmers and fishermen, small island inhabitants, victims of war/conflict, refugees, nomads, those without access to clean water or healthcare, the elderly, children and victims of AIDS and other diseases) will be most vulnerable and therefore need particular attention. This will be especially true under 'surprise' event scenarios.

Allocating responsibility

In practice, the question of who will provide the financial, technical, and institution-building resources needed to help developing countries build their capacity to mitigate

GHG emissions and adapt to climate impacts remains mostly unresolved. This issue is intimately linked with aspects of fairness and justice. Most developing countries have contributed little to atmospheric GHG build-up. Responsibility for helping these countries, and the most vulnerable groups within them, cope with climate change rests with the major polluters. The United Nations Framework Convention on Climate Change (UNFCCC) reiterates this: "the developed country Parties should take the lead in combating climate change and the adverse effects thereof." The UNFCCC also refers to developing country parties that are particularly vulnerable to the adverse effects of climate change, but industrialized countries have made little effort to meet these obligations. One concrete action would be to assess the resources required to build developing country adaptive capacity. Another could be exploring ways to allocate responsibility among industrialized nations with a view to burden sharing between these countries and developing nations.

The policy challenge

Adaptation

The IPCC has identified two types of adaptation: autonomous and planned. The latter is more promising for climate change. Planned adaptation can be passive or anticipatory. Passive adaptation (for example, buying additional water rights to cope with a drying climate) is reactive in nature. It is rarely smooth or instantaneous, as is often assumed. Rather,

it is often delayed as those affected try to distinguish true climate change trends from a noisy background of random climatic fluctuations. Along with poor planning, this can lead to ‘maladaptation’.

Anticipatory adaptation has considerable policy potential. It could include technical actions such as buying more efficient irrigation equipment, engineering seeds and building higher bridges and dams. It could also include policy actions such as establishing networks to disseminate climate information and suggest adaptive actions, creating insurance mechanisms or paying disadvantaged groups. Good policy coordination on a range of anticipatory adaptation actions can help avoid maladaptation.

Most anticipatory adaptation studies assume countries and groups can afford it, which is not universally true. Several funds have therefore been established to help developing countries pursue adaptation

are lacking. Eligibility rules need clarification and standardization.

Abatement

Many assume, particularly under CBAs, that mitigation (GHG abatement) and adaptation are competing strategies for dealing with climate change, but this trade-off requires us to consider justice implications. Suppose it was cheaper for a rich, high-emitting industrialized nation to adapt than to mitigate. If the nation chose only to adapt, its unabated emissions would damage a poorer, less adaptable country. Comparing mitigation and adaptation costs across all nations in a ‘one dollar, one vote’ system therefore has serious equity implications. Low-cost options for one country are often high-cost options for other countries or groups within countries. Industrialized nations should therefore reduce their emissions and help developing nations to do the same, and help developing

80 per cent of current anthropogenic atmospheric CO₂, agreed to reduce their overall emissions by 5.2 per cent below 1990 levels between 2008 and 2012. Developing countries had no such emissions targets or time-tables. However, if developing nations insist on equal global per capita emissions, CO₂ levels could more than triple beyond the 21st century, almost certainly causing ‘dangerous’ warming. The Protocol is therefore only a starting point for international climate policy. To slow down the rate of climatic change we need stronger emissions reductions than envisioned in the first commitment period of the Kyoto Protocol.

Eventually, all major emitters must participate, developed and developing countries alike. However, from a justice perspective it is inappropriate that the costs of abatement or adaptation activities be shared equally, especially in the initial phases of global agreements. The current situation favours developed countries, which enjoy a tenfold advantage in emissions per capita. The distribution of ‘who plays’ can differ greatly from ‘who pays’ – the latter being what the COP process calls “common, but differentiated responsibilities” for burden sharing. The Kyoto Protocol’s Clean Development Mechanism (CDM) and Joint Implementation (JI) initiatives embrace this idea. They help rich nations reach their Protocol targets more cost-effectively, whilst helping developing nations become venues for low-cost, clean technologies for emissions abatement. This

“Low-cost options for one country are often high-cost options for other countries”

measures, the most well known being the Marrakech Funds (established at the seventh Conference of the Parties – COP 7 – in Marrakech in 2001) and the Global Environmental Facility’s (GEF) climate change operational programme. These funds are a promising development, but guidelines for determining which adaptation projects deserve funding

countries build their adaptive capacities.

The most comprehensive agreement on emissions abatement is the Kyoto Protocol. Due to Russia’s recent ratification, this will enter into force (perhaps undermined by the Bush Administration’s refusal to accept it). Under the Protocol, the developed (Annex I) signatory countries, which account for about



Before: Local people in Nepal using biomass fuel on a three stone fire Photo: ITDG, Nepal

bypassing of older technologies and pursuing more efficient, high-technology solutions is known as ‘technology leapfrogging.’

It will be difficult economically, politically, and ethically to develop fair, affordable, and politically acceptable leapfrogging schemes in all sectors and regions. Hopefully, efforts in the last decade to develop a cooperative international negotiation process based on cost-effectiveness and fairness can be extended to climatically ‘safe’ agreements in the future. Using a ‘sustainability approach’ rather than a traditional CBA will help achieve this goal, avoid surprises (which CBAs downplay due to discounting, which makes future catastrophes insignificant for present cost considerations), and keep an equity focus.

National policies should apply the same principles.

The Kyoto Protocol allocates emission quotas according to 1990 emission levels. Such a system may help smooth the transition, but eventually, a scheme based on fairness and justice may be the only way to build consensus for global participation in the UNFCCC. Climate policy decision-makers should aim for a long-term goal of equitably allocating ‘rights to the atmosphere’, or at least agreeing on some common principles for determining acceptable national emissions trajectories.

Policy winners and losers

Even if future climate policies produce ‘optimal’ combinations of abatement and adaptation measures, the results may still be unfair. Climate change policy decisions don’t always benefit the most vulnerable countries or groups within countries. The most marginalized groups often have limited access to information and communications, and little political or economic power. They therefore have little influence over the decision-making process. Conversely, people with political and economic power who are less vulnerable to climate change damages tend to control policy-making. Hence, policies cater to special interest groups like the coal industry or countries like the United States at the expense of more needy groups or nations.

Marginalized groups are often excluded from climate debates because they are not major emitters. For example, two billion



After: Reduced emissions in the same kitchen with an improved efficiency rocket stove

Photo: ITDG, Nepal

people globally depend on biomass (animal dung, crop residues and wood) for energy. Recent research has shown that using biomass is not carbon neutral, but policy-makers and non-government organisations dealing with climate change policy often forget biomass users, who constitute the poorest third of humanity and have very low per capita energy use and emissions. Most climate change aid goes to current or future polluters in developing nations, whilst people conducting relatively climate-friendly practices are ignored. This has been termed the ‘polluters get paid’ principle. Traditional biomass use is not sustainable, for example the indoor air pollution it causes has major health effects. Biomass us-

ers need improved energy services but most climate discussions overlook these people despite their (involuntary) low emissions and consequent compliance with UNFCCC goals.

To avoid overlooking or further subjugating already-marginalized groups when forming local, national and international climate policy, decision-makers should consider assessing climate change costs and benefits using a more equitable framework like the five measures. They should also consider the effects of actions (and inactions) on the distribution of people's well-being and sustainability of other species. In a framework of 'distributed justice', disadvantaged countries and groups should be prioritized. In the case of biomass users, some suggest that petroleum should have an energy-poverty alleviation levy, with funds used to provide biomass users with cleaner-burning fuels like

kerosene. This levy would lead to a decrease in GHG emissions, as higher petroleum costs would reduce demand enough to more than offset emissions from increased kerosene use. In addition, eliminating the products of incomplete biomass combustion, which are also GHGs, will provide climate and health benefits. Changing from biomass to fossil fuel use may seem heretical, but moving climate debates forward justly requires unconventional thinking.

Conclusions

Given the uncertainties in climate science and impacts estimates, we need to slow down the rate we add to atmospheric GHG levels. This will give us more time to understand what may happen and to help develop lower cost mitigation options. GHG abatement policies will provide incentives to invent cleaner,

cheaper technologies. Industrialized countries should aggressively lead the effort, given their historical contribution to the problem and greater capacity to help. Simultaneously, developing country and marginalized group needs should be considered and fulfilled through adaptation and abatement actions coordinated within and among countries. Industrialized countries should shoulder this burden, as required by the UNFCCC. Developing countries need assurances that national GHG abatement actions will not jeopardize a fair resolution of long-term emissions allocation. Discussions and movement on this issue are urgently needed. Slowing down pressure on the climate system and addressing marginalized country and group needs are the main 'insurance policies' we have against potentially dangerous irreversible climate events and associated injustices. ■

ABOUT THE AUTHORS



● **Ambuj Sagar**, a researcher at the Kennedy School of Government at Harvard, works on a range of issues relating to energy and environment, technological innovation and equity.



● **Janica Lane** is a research assistant to Professor Stephen Schneider at Stanford University. She conducts research related to climate change and other topics.



● **Stephen H. Schneider** of Stanford University is a climatologist and professor in the Department of Biological Sciences and a Senior Fellow at the Institute for International Studies.

CONTACT

● **Ambuj Sagar**, Science, Technology and Public Policy Program, Belfer Center for Science and International Affairs, John F. Kennedy School of Government, Harvard University, 79 John F. Kennedy St., Cambridge, MA 02138 USA

Email: ambuj_sagar@harvard.edu
Fax: 1-240-214-2584

● **Janica Lane**, Center for Environmental Science and Policy, Encina Hall, 616 Serra St., E400, Stanford University, Stanford, CA 94305-6055, USA

Email: janica@stanfordalumni.org
Fax: 1-603-484-0413

● **Stephen H. Schneider**, Department of Biological Sciences, Herrin Hall, 371 Serra Mall Stanford, CA 94305-5020, USA
Email: shs@stanford.edu **Fax:** 1-650-725-4387

EU TARGETS

European Union (EU) environment ministers have proposed new emissions targets post-Kyoto.

It is proposed that industrialized nations cut emissions from 1990 levels by 15 to 30 per cent by 2020 and by 60 to 80 per cent by 2050. The EU had previously been reluctant to discuss post-2012 targets to avoid discouraging United States participation. But Serge Lepeltier, French Environment Minister, said that "it would have sent a bad signal to the whole world" if EU states did not set targets.

Read more:
www.tiempocyberclimate.org/newswatch/arnews05.htm#050327

CLIMATE SCIENCE

Studies by United States scientists have underlined the inevitability of climate change and sea level rise even if greenhouse gas emissions are severely reduced.

"The feeling is that if things are getting bad, you hit the stop button. But even if you do, the climate continues to change", said Gerald Meehl of the National Center for Atmospheric Research in Boulder, Colorado. Even under the most optimistic emissions scenario, global temperatures will continue to rise by up to 0.6°C over the next 100 years.

Read more:
www.tiempocyberclimate.org/newswatch/arnews05.htm#050327

GLACIAL MELT

Large areas of melt-water held behind glaciers threaten mountain communities, according to European scientists.

"In the Himalayas, some glaciers are up to 70 kilometres long," warned Martin Beniston of Fribourg University in Switzerland. "In Bhutan alone, there are at least 50 lakes in this category, and a similar number in Nepal as well. Towns and villages in their path could be hit by a torrent of water like a tsunami." Glaciers are retreating in the Andes, Alps, Europe and the Himalayas due to higher temperatures and reduced snowfall.

Read more:
www.tiempocyberclimate.org/newswatch/arnews05.htm#050306

KYOTO PROTOCOL

The Kyoto Protocol to the United Nations Framework Convention on Climate Change came into force on February 16th 2005.

The United States and Australia remain outside the agreement. "We will continue to pressure hard for all of our international partners to come on board," said Stavros Dimas, European Union Environment Commissioner. With the Protocol's entry into force, industrialized nations must meet targets for limiting emissions, and the international carbon trading market, Clean Development Mechanism and Adaptation Fund will become operational.

Read more:
www.tiempocyberclimate.org/newswatch/arnews05.htm#050227

CONFERENCE

The Avoiding Dangerous Climate Change conference took place in Exeter in the United Kingdom in February.

A precise threshold beyond which "dangerous interference" with the climate system could occur was not defined. But the final conference notes state that "a number of new impacts were identified that are potentially disturbing." Bill Hare, visiting scientist at the Potsdam Institute for Climate Impact Research in Germany warned that the European Union target of restricting global warming to 2°C "may even be too high in the long-term."

Read more:
www.tiempocyberclimate.org/newswatch/arnews05.htm#050213

The ecological debt crisis

Andrew Simms describes the ecological debt crisis, best demonstrated by global warming

On 17th March 2005, surprise echoed around the world as news broke that Paul Wolfowitz, a leading United States neo-conservative had been nominated for president of the World Bank. The surprise was amplified because the Bank had worked hard in recent years to align their image with their stated purpose of global poverty reduction. Nominating a candidate whose skills lay in formulating aggressive military strategy was guaranteed to increase the shock.

Wolfowitz' nomination was neither the first controversial one for the Bank, nor the first to coincide with a period of United States military adventurism. Wolfowitz may be hoping for an image change much like his predecessor, Robert McNamara. McNamara's reign at the Bank began in 1968 and rehabilitated his reputation, which had been damaged by his role in escalating United States

military aggression in Asia around the time of the Vietnam war.

Much of today's rhetorical commitment to global poverty reduction by international leaders can be traced back to McNamara's term of office. In fact, it was an undeserved reputation because between 1968 and 1981 when McNamara was president less than 10 per cent of World Bank loans went to areas generally understood to target poverty di-

MAIN POINTS

- **Andrew Simms** compares two debt crises: the foreign financial debt crisis suffered by poor nations and the ecological debt crisis faced by rich nations.
- Ecological debt is when you use more than your fair share of

the Earth's resources. It is best demonstrated by climate change.

- To reduce greenhouse gas levels equitably he proposes rich nation 'sustainability adjustment programmes' and equal global per capita emissions rights.

rectly, like health, education and supplying clean water.

At the time of McNamara's appointment, the American Association for the Advancement of Science posed three questions on world challenges. These remain unanswered today:

1. How to live on a finite earth.
2. How to live a good life on a finite earth.
3. How to live a good life on a finite earth at peace and without destructive mismatches.

Herman Daly, founder of environmental economics, took these observations and asked another question. He observed that the earth, observed from a physical science and biological perspective, is a steady-state open system characterized by a shifting, but self-balancing equilibrium. He asked, "why not our economy also?"

Today, in asking how to re-engineer the global economy to be climate proof, climate

friendly, secure and able to provide everyone the opportunity for a 'good life', World Bank plans require close examination. This is because we are trapped between two debt crises: the foreign financial debt crisis suffered by most of the poor world (which depending on your viewpoint has been either managed or exacerbated by the World Bank), and the ecological debt crisis faced by the rich world, best demonstrated by climate change. Both are the result of economics, or rather, the stories economists tell. The differences between the two financial and ecological debt crises can tell us much about what went wrong, and the language of economics and debt can give us fresh insights into the biggest ecological debt of all: climate change.

More than any other institution, the Bank has set the framework for development policy in recent decades. Its drive to privatize, liberalize and deregulate – the so-called 'Washington consensus' – is now largely discredited, but still affects policies enough to prevent better, more flexible alternatives.

The main reason that the Bank could dictate the economic futures of so much of the Southern hemisphere for so long, was because of the leverage it had through those countries' foreign debts. All countries borrow and the Bank held the key to international finance. An indebted country that did not do what the Bank said was excluded from the international financial system. Foreign debt and the promised escape pathway of 'structural adjustment' have been the domi-



Just as Tuvalu gains from selling its virtual domain, it is in danger of losing its real one

Photo: Andrew Simms

nant development narrative for over two decades. Reconciling the North's ecological debt could now become the new narrative in the coming decades for a different development path.

The most interesting thing about much poor country debt, compared to Northern ecological equivalents, is its illegitimacy. From the International Monetary Fund (IMF) approved kleptocratic government in Mobutu's Zaire, to the corruption, asset stripping and violence of Nigeria's oil fields, there are many examples of how responsibility for Southern countries' debts lay at least as much in Western capitals. With the ecological debt of climate change, however, responsibility is much easier to attribute, and much harder to argue with.

Yet, somehow in international relations we have a situation where 'debtor' is a term synonymous with economically weak poor

countries. And 'creditor' refers to the so-called efficient rich, industrialized nations. These terms are not just economically descriptive. They carry weight and moral judgments. 'Debtor' suggests fecklessness, dependency and incapacity. 'Creditor' suggests support, generosity, trustworthiness and solidity.

In the last fifty years, strategically important friends of rich and powerful countries have had their debts written-off, and poor, strategically unimportant countries have been forced to repay. Germany was given post-war debt relief in 1953 around four times more generous than that offered to the least developed countries in Africa during the 1990s. Egypt was treated well after the Gulf war, as was Poland during the end of the Cold war. By contrast, in 1997 the Archbishop of Cape Town said that, "the external debt of developing countries has become an eternal debt."

After seven years of the Bank-sponsored Highly Indebted Poor Country (HIPC) debt relief initiative, by 2003 only eight countries had had any of their debt cancelled. Of the original 41 highly indebted countries, 39 (that were functioning states) would still require total debt cancellation to stand any chance of meeting poverty reduction targets. Yet even to benefit from small amounts of debt relief, very poor countries had to cope with economic policy conditions, which by a growing consensus caused more harm than good.

Poor countries, lacking the systems of health, education and social support that

the North enjoys, had to tolerate badly designed 'structural adjustment programmes' intended to solve the debt crisis. The Financial Times (a conservative British newspaper) commented that the IMF, the Bank's sister organisation, through promoting these programmes under the so-called Washington consensus "probably ruined as many economies as they have saved." Nobel Prize winning economist James Tobin echoed this thought, saying "their standard remedies, fiscal stringency and punitive interest rates, are devastating to economic life."

Southern experiences with largely illegitimate financial debt problems shame the Northern reluctance to adjust lifestyles in any way, in view of ecological debts. I call climate change an ecological debt problem because it represents a large group of society living increasingly beyond its means. When you use more than your fair share of the Earth's resources (in this case atmospheric ability to safely absorb greenhouse gases) you accumulate an ecological debt.

A decade after the United Nations Framework Convention on Climate Change (UNFCCC) was signed, countries including the United States, Australia, Canada, and many European nations are emitting more carbon dioxide per person than they were at the time of the 1992 Earth Summit. To put this in perspective, in less than two days a United States family uses the equivalent in fossil fuels per person as a family in Tanzania will depend on for the whole year.



Britain and France divide the world in colonial times, much like today's rich countries occupy more than their fair share of the atmosphere
Antique cartoon by James Gillray

If the idea of ecological debt sounds novel, the principle is not. In the 19th century, the patriotic observer of the British Empire Robert Southey had a character in his Letters from England comment, "all parts of the world are ransacked for the Englishman's table." The 1960s saw a second wave of anxiety about unsupportable population levels. This inspired Georg Borgstrom to comment on the 'ghost acres' that wealthy countries like Britain depended on in other lands to feed their people. In 1974, Ivan Illich writing in Energy and Equity considered notions of well being and conviviality in relation to energy dependency. He wrote that a society based on low energy use and equal access to resources would be more convivial and supportive of democracy; "a low energy policy allows for a wide choice of lifestyles and cultures. If, on the other hand, a

society opts for high energy consumption, its social relations must be dictated by technocracy and will be equally distasteful whether labeled capitalist or socialist."

In the late 1980s, enquiries into equity and geographical carrying capacity introduced the language of 'environmental space.' At the start of the 1990s, Canadian geographer William Rees began talking about 'ecological footprints.' The late Indian environmentalist Anil Agarwal, with colleague Sunita Narain, applied a harder political edge to these arguments in 1990 in Global Warming in an Unequal World, which exposed the wildly different degrees to which people in rich and poor countries pollute. They also wrote about what they called 'environmental colonialism.' These people all showed that rich people took up a lot of space. They were like cars badly parked at a supermarket, crossing several parking bays and using more than their fair share of space.

Before the 1992 Earth Summit, a group from Latin America and the Caribbean compiled a report called Our Common Future. This argued that "the industrial revolution was based in large part on the exploitation of natural resources in ways which did not reflect their true costs." It concluded, "the industrialized countries have incurred an ecological debt with the world." Ecuador is now home to a campaign to reclaim the debt.

Although financial debt topped the anti-poverty agenda in numerous international meetings in the mid-to-late 1990s, both cli-

mate change as an issue, and ecological debt as a concept, were almost absent in the mainstream development debate. Now it is time to put the concept of ecological debt, and the necessary adjustments that this will require, into negotiations on what will follow the Kyoto Protocol. We must argue for the rich country emissions cuts of 60 to 90 per cent that science tells us is necessary.

Economic superpowers have been as successful today in their disproportionate occupation of the atmosphere with carbon emissions, as they were in their military occupation of the terrestrial world in colonial times. Until the Second World War, they managed this atmospheric occupation largely by exploiting their own fossil fuel reserves. However, from around 1950, as global incomes diverged, industrialized countries became increasingly dependent on energy imports. Less developed countries experienced the opposite. From about the same time they began to produce more than they consumed.

Using a 'World Energy Gini Coefficient' to measure inequality, Bruce Podobnik shows that for the second half of the last century, with the exception of one decade, global inequality in energy consumption continued to increase in line with a long historical trend. By 1998, the wealthiest fifth of the world's population were consuming 68 per cent of commercial energy, and the poorest fifth, two per cent.

But is there any hope that the advanced industrial economies could make the cuts

in resource use required? To reject this challenge would be very hypocritical. The world's poorest countries have had to reshape their economies for decades to pay service on unprincipled foreign debts. There should therefore be no reason why rich countries cannot do the same to pay off their more real ecological debts. It is time for the rich world to work within 'sustainability adjustment programmes' under a negotiated framework for shrinking global emissions in which entitlements to emit greenhouse gases move within a set time frame to equal per capita shares.

The language of fiscal restraint permeates the neo-liberal economics that still dominate official development thinking. Yet the concept of living within our environmental means still escapes mainstream economics. Climate change and the challenge of reconciling our ecological debts could, finally, change this.

Everyone from the former United Nations weapons inspector Hans Blix, to Sir John Houghton, formerly of the Intergovernmental Panel on Climate Change, and United Kingdom government chief scientific advisor David King, have all said that climate change is a greater threat to the world than terrorism. If Paul Wolfowitz does take over from James Wolfensohn at the World Bank, the question will be the same of all new generals; is he capable of fighting the new war, rather than re-fighting the old one, so that we can all have a "good life on a finite earth at peace and without destructive mismatches." ■

ABOUT THE AUTHOR



● **Andrew Simms** is Policy Director of the new economics foundation, London, UK.

CONTACT

● **Andrew Simms**, New Economics Foundation, 3 Jonathan St, London SE11 5NH, UK.

Fax: +44 (0) 20 7820 6301

Email: andrew.simms@neweconomics.org

FURTHER INFORMATION

● Andrew Simms' book *Ecological Debt: the health of the planet and the wealth of nations* is published on May 16th by Pluto Books.

CONFERENCES

4th International Symposium on Non-CO₂ Greenhouse Gases: Science, Control, Policy & Implementation

Utrecht, The Netherlands
04-07-2005 to 06-07-2005

Organized by the Clean Air Section of the Netherlands Association of Environmental professionals. Will address the role of non-CO₂ greenhouse gases in human-induced climate change. NCGG-4 will also focus on the implementation of new technologies in industry and society that are seen to be cost-effective options.

Details: NCGG-4 Organizers, Netherlands Association of Environmental Professionals, PO Box 2195, NL-5202 CD Den Bosch, The Netherlands. Fax: +31-73-6216985.

Email: cfp@ncgg4.nl
Web: www.ncgg4.nl

People & the Sea III: New Directions in Coastal & Maritime Studies

Amsterdam, Netherlands
07-07-2005 to 09-07-2005

Major themes of the conference are: fisheries; integrated coastal zone development; maritime work worlds; and, maritime risks and vulnerability. Activities will comprise of keynote presentations on related issues plus a closed panel debate on the third day.

Details: Iris Monnereau, Centre for Maritime Research, Nieuwe Prinsengracht 130, Room G.2.05, NL-1018 VZ Amsterdam, The Netherlands. Fax: +31-20-5254051.

Email: imonnereau@marecentre.nl
Web: www.marecentre.nl

2005 ACEEE Summer Study on Energy in Industry

New York, USA
19-07-2005 to 22-07-2005

Theme of the course is "Cutting the High Cost of Energy". Papers and presentations will focus on: industrial energy efficiency measures and technologies; industrial fuel diversity; leadership and management practices in industrial energy efficiency; industrial energy efficiency and sustainability issues; role of government and programmes in industrial energy efficiency; and, data, analysis and modeling of industrial energy efficiency.

Details: Rebecca Lunetta, ACEEE, PO Box 7588, Newark DE 19711-7588, USA. Email: rlunetta@comcast.net
Web: www.aceee.org

International Conference on Energy, Environment & Disasters

Charlotte, USA
24-07-2005 to 30-07-2005

Participants for INCEED 2005 will include researchers, corporate officials, policy makers, teachers and students. Over 100 sessions, panels and forums will feature keynote lectures, presentations, recorded debates and discussion panels. INCEED 2005 is an outgrowth of the regular ISEG conferences, begun in 1993, with the objective of addressing critical issues in sustainable development.

Details: Hilary Inyang, International Society of Environmental Geotechnology, Global Institute for Energy & Environmental Systems, University of North Carolina, Charlotte, USA.

Email: iseg@unc.edu
Web: www.iseg.giees.unc.edu/jinceed2005

2005 Children's World Summit for the Environment

Aichi, Japan
26-07-2005 to 29-07-2005

The Children's Summit, to take place during Expo 2005, will focus on energy, recycling, water, forests and biodiversity. It is estimated that over 1,000 children and their parents from around 100 countries will attend. Seven representatives from UNEP countries plus four children from Japan made up the Junior Board which worked with UNEP and the Japan Organizing Committee to develop event agendas.

Details: Yoshihiko Kanei, Children's World Summit Section, Dept. of the Environment, Aichi Prefectural Government, 3-1-2 Sannomaru Naka-ku Nagoya, Aichi 460-8501, Japan. Fax: +81-52-9614901.

Email: yoshihiko_kanei@pref.aichi.lg.jp
Web: www.children-summit.jp

The Fascinating Atmosphere: Changeable & Changing

Beijing, China
02-08-2005 to 11-08-2005

Conference organized by the International Association of Meteorology and

Atmospheric Sciences (IAMAS). Will also include the IGBP-PAGES 2nd Open Science Meeting to be held from the 10th to 12th August. IAMAS 2005 will cover such issues as: climate variability; climate change in the past and future; global air pollution; monsoons and typhoons; and stratospheric ozone depletion, amongst others.

Details: Secretariat of IAMAS 2005, LASG/Institute of Atmospheric Physics, Chinese Academy of Sciences, PO Box 9804, Beijing 100029, China. Fax: +86-10-62043436.

Email: iamas@iasg.iap.ac.cn
Web: www.iamas2005.com/

Solar World Congress 2005

Orlando, USA
06-08-2005 to 12-08-2005

The Congress marks the 50th anniversary of the first major solar conference held in Arizona in 1955 and will hold a special session for this occasion. Discussions will focus on considering the linkages between solar and water issues under the theme "Bringing Water to the World." Participants to include researchers, scientists, engineers, architects, designers and other renewable energy professionals.

Details: Becky Campbell-Howe, American Solar Energy Society, 2400 Central Ave, Suite A, Boulder, Colorado 80301, USA. Fax: +1-303-4433212.

Email: bchowe@ases.org
Web: www.swc2005.org

Dynamic Planet 2005

Cairns, Australia
22-08-2005 to 26-08-2005

Organized jointly by the International Association of Geodesy, the International Association for Physical Sciences of the Oceans, and the International Association for Biological Oceanography. Theme for the scientific programme is "Monitoring and Understanding a Dynamic Planet with Geodetic and Oceanographic Tools" and as such will emphasize the interaction of the earth and oceanographic sciences.

Details: DynamicPlanet2005 Secretariat, c/o Event Planners Australia, GPO Box 2609, Sydney, NSW 2001, Australia. Fax: +61-2-92411478.

Email: info@dynamicplanet2005.com
Web: www.dynamicplanet2005.com/Default.htm

9th International Conference on Environmental Science & Technology

Rhodes Island, Greece
01-09-2005 to 03-09-2005

Organized by the Global Network for Environmental Science and Technology and the Department of Environmental Studies at the University of the Aegean. Conference will focus on global environmental change and ecosystems management, water quality issues, water resources management and planning, and solid waste management, recycling and sustainability. Will also present the most recent developments associated with related

environmental problems.

Details: Conference (9CEST) Secretariat, University of the Aegean, 30 Voulgaroktonou str. GR 114 72 Athens, Greece. Fax: +30-210-6492499.

Email: cest@gnest.org
Web: www.gnest.org/cest

ICB 2005

Garmisch-Partenkirchen Germany
05-09-2005 to 09-09-2005

The 17th International Congress of Biometeorology has, as its main theme, "Adaptation to weather, climate and climate change". Organized by the International Society of Biometeorology. Focus topics for forum discussion include: climate, weather and human health; agricultural and forest meteorology; effects of extreme climates on humans, plants and animals; urban climatology; and, phenology, amongst others.

Details: Congress Secretariat, INTERPLAN AG, Albert-Rosshaupter Str 65, D-81369 Munich, Germany. Fax: +49-89-54823443.

Email: icb2005@i-plan.de
Web: www.icb2005.de

River Basin Management 2005

Bologna, Italy
06-09-2005 to 08-09-2005

Conference is aimed, in particular, at bringing together practising engineers, environmental managers and academics in the field. Case studies are encouraged where delegates can share problems and solutions with the wider international community. Spe-

cific topics include: river ecology; flood forecasting; geomorphology; and, field and laboratory data for riverine basins.

Details: Rachel Green, River Basin Management 2005, Wessex Institute of Technology, Ashurst Lodge, Ashurst, Southampton SO40 7AA, UK. Fax: +44-0238-0292853.

Email: rgreen@wessex.ac.uk
Web: www.wessex.ac.uk/conferences/2005/irm05/absform.htm

2nd International Congress & Innovation Fair: Sustainable Management in Action

Geneva, Switzerland
19-09-2005 to 20-09-2005

Organized by the Association of Sustainable Management in Action and the University Centre of Geneva for Human Ecology and Environmental Sciences. Main plenary topics include: concepts and strategies in sustainable management; tools of sustainable management; technological innovations in sustainable management; and, forum of SMEs.

Details: Therese Wolf, Secretariat SMIA05, 20 Avenue du Grey, CH-1004 Lausanne, Switzerland. Fax: +41-21-6465935.

Email: organisation@smia.info
Web: www.smia.info

Seventh Annual Bioecon Conference on Economics & the Analysis of Ecology & Biodiversity

Cambridge, UK
20-09-2005 to 21-09-2005

Organized by University College London and University of Cambridge in the UK together with the Norwegian University of Science and Technology. Sessions will examine the management of biological resources and biological processes as well as sessions discussing the economic analysis of policies for biodiversity conservation. *Details: Per Stromberg, Department of Land Economy, University of Cambridge, 19 Silver Street, Cambridge CB3 9EP, UK.*

Email: pmjs2@cam.ac.uk
Web: www.bioecon.ucl.ac.uk

6th Open Meeting of the Human Dimensions of Global Environmental Change Research Community

Bonn, Germany
09-10-2005 to 13-10-2005

Sub-title for the meeting is "Global Environmental Change, Globalization and International Security: New Challenges for the 21st Century". Session topics, amongst others, include: adaptive management and resilience; coastal zones, human use of oceans; institutional dimensions of global environmental change; and, methods in human-environment studies.

Details: Lisa Mullin, Open Meeting 2005 Organizer, University of Bonn, Regina-Pacis-Weig 3, D-53113 Bonn, Germany. Email: mullin.ihdp@uni-bonn.de
Web: www.uni-bonn.de

[Visit www.tiempocyberclimate.org/newswatch/](http://www.tiempocyberclimate.org/newswatch/) for a comprehensive list of conferences.

Sustainable village energy

Adam Harvey describes a successful programme designed to provide sustainable forms of energy to villages in Lao PDR

In Lao PDR, ad hoc solutions to rural electricity supply exist everywhere on a household-by-household basis. Small private hydro generators powered by local irrigation channels and rivers may be used or an entrepreneur may charge batteries or connect wires from a private diesel generator to several houses.

These kinds of solutions are generally expensive, unsafe, unreliable or available only seasonally. Expenditure by villagers is often in the order of us\$2 per month or more. Poorer households relying on non-electrical lighting from wick-lamps, typically spend more than us\$1 per month on fuel, and receive a very inadequate standard of illumination.

Improved lighting in rural houses is generally considered a major step forward in the quality of life. It stimulates better health practice (use of mosquito nets, hygiene), increased opportunities for education, and evening income-generating activities. The

use of radios and televisions is often considered a step forward in terms of increased knowledge and motivation. Daytime electricity supply gives rise to a greater range of income-generating opportunities.

Reliable and better-quality electricity services are in strong demand from rural people.

Over the past three years, a team of Lao experts has been training small companies to become village energy service specialists, to work in areas not due for electricity grid connection. These Electricity Service Com-

MAIN POINTS

- **Adam Harvey describes** a successful programme designed to provide sustainable forms of energy to villages in Lao PDR.
- **He explains** that reliable and better-quality electricity services are in strong demand.
- **He concludes** that the programme provides real opportunity for the private sector and for Lao villagers.

panies offer a choice of electricity supply technology, so that there is a solution for each village.

Most villages have chosen Solar Home Systems, but as the companies begin to work in the remoter cloudy and hilly areas, more villagers are choosing village-scale hydro systems.

This article outlines progress with the off-grid programme so far, focusing on best practices, that is, choices made through careful testing of options, to ensure a reliable service for Lao villagers and a self-sustaining framework for implementing companies. We have tried to move from project-cycle vulnerability, to a solid national programme providing real opportunity for the private sector and for the majority of Lao villagers.

The off-grid programme

A major challenge for the programme has been to develop a framework within which an

increasing number of companies can operate consistently over many years into the future. An ambitious goal for Laos is to connect 75 per cent of rural families to the grid by 2020, and to help at least another 15 per cent to receive off-grid electricity by this time. This would mean companies could be delivering over 10,000 connections per year over the next fifteen years as well as providing ongoing service support to large numbers of operational systems.

Another key challenge has been to make sure the stand-alone electricity installations operate reliably for many years.

The solution has been to develop a 'rent-to-buy' or hire-purchase mechanism. In the case of villagers choosing Solar Home Systems, they buy the equipment by monthly payments over a period of several years. The solar panel then becomes an important economic asset to poor families, since it retains high re-sale value. The villagers choose a Village Electricity Manager to provide technical support over this period and beyond.

In the case of hydro and engine-generators, this Village Electricity Manager hire-purchases the equipment personally, using it to run a small business selling electricity. In both cases, prospective ownership has proved in practice to be an excellent motivation to take care of the equipment.

The Village Electricity Manager and the Electricity Service Company both receive a portion of each monthly hire-purchase payment. In this way, a technical and manage-

ment structure is permanently in place to support the long-term needs of operational customers. Both the Company and the Village Electricity Manager have a strong incentive to maintain the equipment in good working order, as they lose income if villagers withhold payments for any reason.

Although the focus of the programme so far has been on electricity supply, the regulatory framework and financing approach has been designed to work for a wide range of renewable energy options for rural communities.

The Electricity Service Companies are able to diversify into technologies such as biogas-based cooking, biomass or solar thermal powered generators, using the same



A solar home system

Photo: © Adam Harvey

financing and administration structures. This financing method is suitable for energy installations orientated toward production and processing as well as for domestic needs, and the programme is starting to prioritize productive applications.

BACKGROUND INFORMATION

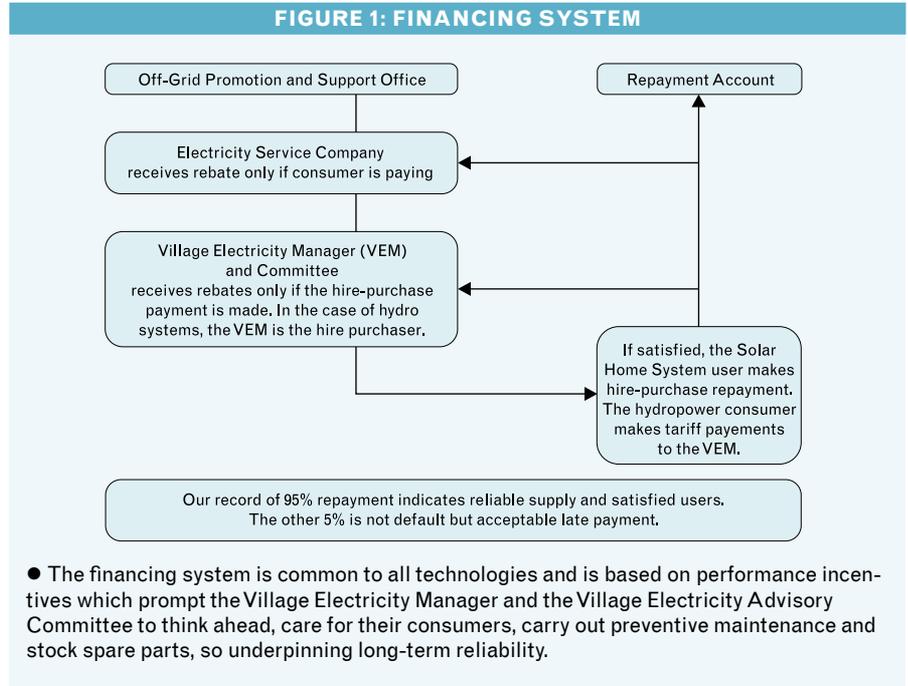
- The off-grid programme has been developed by an Off-Grid Promotion and Support Office located within the Ministry of Industry and Handicraft in Vientiane. The team includes government officials, and personnel recruited from the private sector. The work is funded by a soft loan from the World Bank, combined with a Global Environment Facility grant.
- The programme started in 1999 with pilot work in villages on low-cost technology, local manufacture and participative and business-orientated planning procedures. It then progressed through 2000 and 2001 to the creation of appropriate government policies and regulations. By 2002 a professional consulting team was in place, and companies started to be trained. In 2003 the bulk of the dissemination work was carried out by the Electricity Service Companies.
- The programme is to be extended in the period 2005 to 2010 to connect about 30,000 more households. During this five-year period a structure (an Off-Grid Promotion or Rural Energy Fund) will be established to attract additional soft credit from sources other than the World Bank. This will ensure that the rate of dissemination can approach that required (an average of 10,000 a year) for achievement of the Lao government goal of 90 per cent electrification by improved systems by 2020.

Reliability

Our delivery system is designed for reliability. The main mechanism is financial incentive. This works in three ways.

First, the Solar Home System user is buying the equipment, and is motivated to take care of it so as not to lose their investment. In the case of village electricity distribution systems (village hydro, generator-sets, windpower, solar inverters, and so on), the Village Electricity Manager makes a significant private investment and looks forward to increased income at the end of the hire-purchase period. This person is, therefore, motivated to keep the equipment in good condition. They depend on tariff payments for their livelihood, and so are interested and motivated in providing a reliable supply every night.

The second financial incentive works through the Village Electricity Manager, the Village Electricity Advisory Committee (a mediating body) and the Electricity Service Companies all receiving a portion of each user's payment. These portions are called "operational rebates" (see Figure 1). The operational rebates are received only if the user payment is actually made. An unreliable system means the customer does not pay, so the Manager, the Committee, and the Company all lose their rebate. They are, therefore, motivated to think ahead, keep spare parts in stock, check for early warning signs of faults, and make sure the customer knows how to use the equipment well and avoid problems. They become expert at preventive



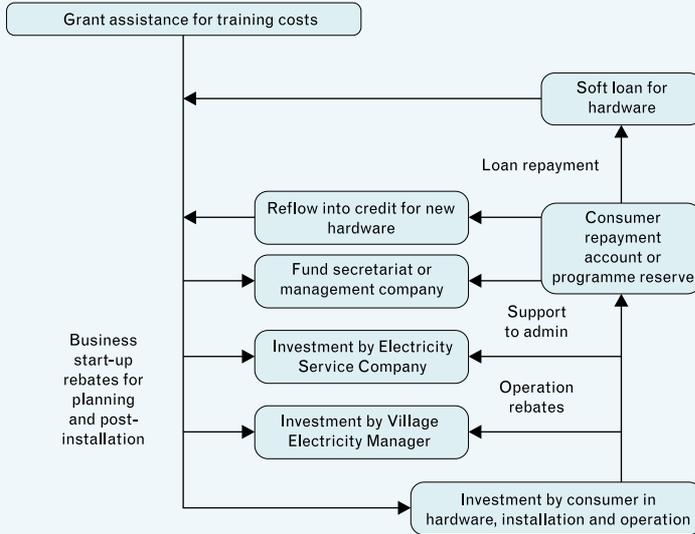
maintenance. They want their customers to be satisfied.

Through the third financial incentive, the Off-Grid Promotion and Support Office does not approve plans for installations in new villages if the Electricity Service Company is not maintaining an average repayment rate above 95 per cent from all their villages. If the Company allows reliability to slip, repay-

ments will slip and the business will fail. The Company is in competition with other Electricity Service Companies, who would then expand their business in their area.

The Off-Grid Promotion and Support Office has designed the Electricity Service Company licence agreement to open each area up to competition two years from the date of signing.

FIGURE 2: INVESTMENTS AND OPERATIONAL COSTS



Another method of ensuring reliability is the progressive increase in private investment by Village Electricity Managers and Electricity Service Companies. This is recouped through reliable payments by customers over many years.

If repayment performance is good, reliability is good. Our delivery system has a repayment performance from consumers of over 95 per cent. The shortfall is considered acceptable late payments rather

than defaults. As of December 2004, 5,000 villagers are receiving “every night, light”, the motto adopted by some of the Electricity Service Companies, some already for four years.

Sustainability

We have designed the delivery mechanism to be robust, by building in financial incentives and ownership incentive to achieve reliable performance. Nevertheless, steering

this mechanism remains a challenge for the forthcoming years.

Although one aspect of sustainability is full commercialization, it is unrealistic to expect that most rural families can afford off-grid under fully commercial conditions. Wealthy villagers, possibly only 10 per cent of the rural population, would be the sole beneficiaries leaving the majority worse off.

Sufficient soft loan funding for 200,000 off-grid connections will hopefully be available in forthcoming years in Laos (the World Bank is now considering a credit to expand this programme to reach 30,000 households). In the context of this credit, our programme makes sure that villagers experience commercial conditions, interacting with private companies on the basis of clear price lists and payment terms.

Figure 2 shows that operational costs are met by consumer repayments, and as the volume of customers grows, a repayment reserve is accumulated.

Even at the current low connection rate, there is already enough reserve to self-finance the administration of the programme for one year. This means that Laos now has a National Programme which can continue to function regardless of fluctuations in external support. It is not dependent on project funding cycles, although its rapid expansion does depend on an inflow of soft loans.

Drawing from the reserve, customers with off-grid connections continue to receive back-up support from Village Electricity

Managers and Electricity Service Companies, who themselves receive back-up from the Off-Grid Promotion and Support Office, even if, for a period of time no external inflow of credit is available for new equipment installations. As the reserve grows larger, it is possible for it to also cover loan repayment costs and to provide credit for new installations.

Productive opportunities

Villagers in Laos are quick to use small electricity supply for income generation.

For example, in one village taking Solar Home Systems, most of the houses immediately moved their weaving looms upstairs. The teenagers were very happy to contribute

Now that extra hours of good quality light are available from the hydro, they are earning significant extra income. With these returns they are more than happy to pay the monthly hydro tariff.

One lady uses the light to sew in the evenings for her customers, one uses a fridge to make cold sweets for sale. A carpenter is using power tools in the daytime, and the Village Electricity Manager is charging batteries for fee-payment. At one stage, ice production started as it proved to be a profitable application.

In conclusion, it would be fair to say that the programme to date has been highly successful which is, in the main, due to the en-

“In one village with hydro supply, the villagers have told us the electric light has increased their incomes significantly”

extra income weaving in the evenings. This income paid back the cost of the solar panel and weaving materials after which there was additional money for the family.

In the same village, we were told the solar lights had increased incomes by allowing net mending to take place at night, and also by allowing the charging of batteries used for fishing and for hunting frogs at night.

In one village with hydro supply, the villagers told us the electric light had increased their incomes significantly. Many of the families make small baskets for sale to tourists.

thusiasm and motivation of the villagers. It is hoped that the plans for further expansion of energy supplies to more villagers will have the same positive outcome. ■

ABOUT THE AUTHOR



● **Adam Harvey** is Adviser to the Off-Grid Programme of the Ministry of Industry and Handicraft in Vientiane, Lao PDR.

CONTACT

● **Adam Harvey**, Off-Grid Promotion and Support Office (OPS), PO Box 9020, Vientiane, Lao PDR

Tel: +856-20-5615488

Email: adamharvey@compuserve.com

FURTHER INFORMATION

● **In the Cyberlibrary:** The Tiempo Climate Cyberlibrary provides a listing of theme sites on renewable energy at www.tiempocyberclimate.org/floor0/theme/t3839web.htm.

ACKNOWLEDGEMENTS

● This feature is based on a detailed description of the programme published in *Renewable Energy for Development* (Vol. 17, No. 2, 2004), the newsletter of the Energy Programme at the Stockholm Environment Institute. This article can be obtained from the author or by contacting the Stockholm Environment Institute, Box 2142, SE-103 14 Stockholm, Sweden. Fax: +46-8-7230348. Email: postmaster@sei.se. Web: www.sei.se



Editorial team:

Saleemul Huq, Hannah Reid,
Sarah Granich, Mick Kelly

Editorial office:

Tiempo, International Institute for Environment and Development, 3 Endsleigh St, London WC1H 0DD, UK
Fax: +44 (0)20 7388 2826
Email: hannah.reid@iied.org and saleemul.huq@iied.org

Distribution: Tiempo is available free on request.

Write to Tiempo, attn: Mick Kelly, School of Environmental Sciences, UEA, Norwich NR4 7TJ, UK, or email m.kelly@uea.ac.uk

Tiempo is published by: the International Institute for Environment and Development, the University of East Anglia and the Stockholm Environment Institute-York, with financial support from the Swedish International Development Cooperation Agency (Sida).

Production Manager:

Erik Willis

Layout: Lisetta Tripodi

Programme coordinator:

Johan Kuylenstierna

Design: A4

Printed by: PMS Marketing Logistics, York

The G8 challenge

The Bush administration appears set to win another victory in its war on global action to prevent dangerous climate change. The latest victim is British Prime Minister Tony Blair's efforts to address the issue through his presidency of the G8. Even if the final G8 communiqué mentions adaptation measures and technology initiatives, the continued rejection by the United States (us) of any multilateral approach will leave a gaping hole in the outcome of Blair's initiative.

The Bush administration's refusal to accept the increasingly alarming scientific findings on climate change is no surprise to most observers. With an approach to science that consists of 'speaking power to truth', the message has been clear and consistent; it will not participate in any agreement that involves real emissions limitations, regardless of the science or any concessions offered. Given this clear commitment to intransigence, what options

are left for the G8 and the rest of the world?

The easy path, especially for those countries whose own fossil fuel intensive industry sectors are resisting further emissions reductions, is to continue to call for us participation while postponing any other actions. But with the latest refusal by the us to take the issue seriously, any further delay would effectively give the us a veto on global action to prevent a climate catastrophe.

The alternative – perhaps more difficult but our only chance of avoiding a climate catastrophe – is for the rest of the world to move ahead with establishing a global regime that can limit and then reduce global greenhouse gas emissions. The us, with its 25 per cent of global emissions, can rejoin this in the future. The multilateral effort to strengthen and build on the Kyoto Protocol and to deepen and broaden commitments in the post-2012 period, based on the principal of common but differentiated responsibilities, must con-

tinue. Industrialized countries must prepare for much deeper cuts to their domestic emissions. Southern countries must urgently find ways to achieve sustainable, low-emissions development, and actively prepare for a carbon-constrained future.

Perhaps the best way to bring the us back into this effort will be to construct an effective global regime, which the us will be compelled to enter through some combination of alarming scientific findings, worsening impacts, election outcomes, growing domestic calls for action and a widening perception of how out of step the us is with the global community. In this context, the greatest contribution of Blair's G8 climate initiative could be to demonstrate the futility of delaying action and continuing to appeal to Bush's good sense.

THE FINAL WORD

Mark Lutes describes how the G8 process could best bring the United States back into multilateral climate change efforts.



Mark Lutes is a Research Associate with the Vitae Civilis Institute in São Paulo, Brazil. He recently participated in civil society consultations with the G8 'sherpas'.
Email: lutes@allnet.com.br