



**SUMMARY OF THE FIRST MEETING OF THE  
GLOBAL FORUM ON SUSTAINABLE ENERGY –  
RURAL ENERGY: PRIORITIES FOR ACTION  
11-13 DECEMBER 2000**

The First Meeting of the Global Forum on Sustainable Energy (GFSE) was held from 11-13 December 2000 at the Headquarters of the International Institute for Applied Systems Analysis (IIASA) in Laxenburg, Austria. The meeting, which addressed the topic of Rural Energy: Priorities for Action, was attended by more than 120 participants representing government agencies, United Nations bodies, business and industry, non-governmental organizations and academia. It was co-sponsored by IIASA, the United Nations Development Programme (UNDP), the City of Vienna and the Austrian Government (Ministry for Foreign Affairs and Ministry for Agriculture, Forestry, Environment and Water Management). Support was also provided by a number of other donors, including the Governments of Norway and Sweden and the Leadership for Environment and Development Foundation (LEAD).

The GFSE developed from outreach efforts related to the World Energy Assessment initiative, which was organized by UNDP, the UN Department of Economic and Social Affairs (UNDESA) and the World Energy Council. It is envisaged that the GFSE will provide a forum for a series of ongoing multi-stakeholder dialogues aimed at facilitating decision-making on energy policy issues in relevant fora.

Participants at this meeting convened in a series of plenary sessions to hear presentations and engage in discussions on: linkages between rural energy and sustainable development; enabling frameworks for attracting investment for rural energy; lessons learned; financing issues; challenges and opportunities of regulatory reform; innovation; and the way forward, including a work plan for the GFSE. They also met in parallel break-out sessions to identify regional priorities and opportunities in relation to enabling frameworks, financing and regulatory issues.

At its conclusion, participants considered the key messages and actions discussed during the meeting. The GFSE's outcomes will contribute to various negotiations and processes, including energy-related work being undertaken by the UN Commission on Sustainable Development at its ninth session (CSD-9) in April 2001. It is also expected to contribute to sustainable energy discussions at the Third UN Conference on Least Developed Countries taking place in Brussels in May 2001, and at the Ten Year Review of the UN Conference on Environment and Development in 2002.

**REPORT OF THE FORUM**

Irene Freudenschuss-Reichl, Ambassador, Permanent Mission of Austria to the United Nations (Vienna), welcomed participants to the First Meeting of the Global Forum on Sustainable Energy (GFSE) and introduced the opening keynote speakers.

Herbert Kröll, Ambassador, Government of Austria, said the GFSE's aim was to provide a platform to foster cooperation on sustainable energy among governments, energy companies, technology providers, investors, and non-governmental organizations. He noted that this first meeting was dedicated to rural energy issues, and highlighted the need to improve the situation of two billion people - living mainly in rural areas - who lack access to commercial energy. In addition, he highlighted the needs of the least developed countries (LDCs). He said this meeting would feed into negotiations taking place in various fora, including the Commission on Sustainable Development.

Arne Jernelöv, Acting Director, IIASA, drew attention to recent reports on energy and sustainable development and outlined IIASA's current research activities, including work on development and distribution of new technologies. Noting the importance of rural energy issues, he expressed the hope that this meeting would lead to more successful discussions on energy and sustainable development.

José Goldemberg, Chair of the World Energy Assessment, presented an overview of the findings of the World Energy Assessment, published in September 2000. He said the report addresses energy and the challenge of sustainability, and attempts to provide a "diagnosis" for problems related to achieving sustainable energy. It also addresses social, environmental, health and security problems resulting from present energy systems. Arguing that the present energy system is unsustainable, he said the Assessment considers requirements for a sustainable future, including energy efficiency, increased reliance on renewable energy sources, and advanced energy technologies, including next generation fossil fuel and nuclear technologies, if the problems and concerns associated with their use can be addressed.

On the report's treatment of rural energy, José Goldemberg said living standards in rural areas could be improved by promoting a shift from using biomass or coal in cooking to liquid or gaseous fuels. He also drew attention to the need to improve technologies for cooking with biomass, and to make progress in rural electrification. He noted that there had been both centralized, grid-based approaches to electrification, as well as a recent shift toward small-scale decentralized

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approaches. He said the Assessment also addressed new institutional measures, including financing. Drawing attention to the “energy ladder” of energy sources ranging from the most primitive to the most advanced, he said developing countries should be able to leapfrog some stages of development that had been followed in earlier decades by industrialized countries. He said the Assessment outlined a matrix of energy solutions in the short, medium and long-term based on sources and for various tasks, including cooking, lighting, motive power, and process heat. He stated that in addition to the environmental and development benefits of taking action, the profit-making considerations of business could be addressed by making energy more sustainable.

### **PLENARY I: EXPLORING THE LINKAGES**

José Goldemberg chaired the Plenary session entitled “Exploring the Linkages,” which was held on Monday morning, 11 December. Goldemberg explained that the focus was on exploring the linkages in relation to rural energy and sustainable development, including opportunities emerging from new technologies for rural energy and barriers to investment. He then introduced the presenters for this session.

**PRESENTATIONS:** Gerald Doucet, Secretary General of the World Energy Council, said sufficient studies had been conducted to understand rural energy issues, and suggested that the focus should now be on drawing out clear lessons and identifying actions. He highlighted energy as a key link in poverty reduction and stressed electrification as critical to development. He said the Council estimated that the number of people without access to commercial energy would increase from 1.8 billion now to 2.2 billion by 2020 based on current trends, and noted that the number of connections had fallen to 30 million per year during the 1990s. He said the goal of achieving 500 kilowatt hours of energy production per person per year by 2020 would require connecting 100 million people per year. The key issue was financing, with the extra capacity costing an estimated US\$30 billion per year in additional investment. Highlighting the role of market-based solutions to rural energy problems, he said it was a business priority as well as a social issue to bring commercial energy to the one-third of the world’s population that currently lacks access, while still cutting greenhouse gas emissions. He said the driver for energy efficiency was effective price and payments systems. He also stated that the World Energy Assessment could have carried out more work on regional collaborations, citing the benefits of progress on energy integration in Latin America. In addition, he said the GFSE could play a practical role in capacity building.

Albert Binger, Director of the Center for Environment and Development, University of the West Indies, highlighted problems facing rural populations in developing countries, including population increases resulting in pressure on the resource base, and income decreases from a relative decline in certain commodity prices. On sustainable energy, he noted the major implications for human health resulting from a reliance on animal dung and other solid fuels used for heating and cooking, which result in poor air quality. In addition, he highlighted the disproportionate costs of energy services in rural areas, asking how formal market solutions can effectively address non-formal market communities. He called for capacity building to develop expertise and said globalization should benefit rather than marginalize rural people. He drew attention to the impact of climate change on rural areas and noted that many industrialized countries did not appear to be on track in terms of meeting their greenhouse gas emissions targets set at Kyoto.

Andreas Wijkman, Member of the European Parliament, stressed that while a business approach could tap into a new market of potential commercial energy users, the rural poor are not generally part of the

formal economy and therefore lack sufficient purchasing power. He indicated that the European Union treats the energy sector quite separately from development issues. He said only 10 percent of EU aid is for energy, and a small proportion of this relates to renewables and energy efficiency. He suggested that the majority of funding for rural energy development will need to come from the private sector and from international financial and trade institutions – including export credit agencies – that are not yet guided by social considerations. He said environment and development agencies should coordinate with trade and finance bodies, and synergies and links between the different sectoral development plans need to be understood. Furthermore, the Group of Eight (G-8) should provide funds to lower prices in key technologies to promote development. He concluded by stating that this meeting was an important step toward achieving broad stakeholder dialogue.

**DISCUSSION:** In the ensuing discussion, a participant suggested raising the profile of the energy-development link by promoting it as an issue within the World Trade Organization. In response to a comment on the importance of mobilizing political pressure among the public and a suggestion that the rural poor required assistance in developing the capacity to lobby effectively, Andreas Wijkman noted insufficient capacity in the UN and other international organizations to meet capacity building needs. Another participant added that currency devaluation is further impoverishing developing countries.

On Tuesday afternoon, 12 December, participants heard an additional presentation on linkages by Philippe De Renzy Martin, CEO, Shell Solar. He described the activities of Shell Solar, which he said focused on the customer and worked back to technology. Although he said rural developing country markets could be viable in the long-term, they are not profitable currently and most sales are dependent on subsidies. However, he stated that solar energy is part of Shell’s long-term alternative energy strategy. He said incentives are vital at this early stage, and subsidies should apply at the customer interface to stimulate demand. For solar to be sustainable there has to be an ongoing commitment that includes distribution and maintenance. In response to a question about reaching a point where a subsidy is not required, Philippe De Renzy Martin said he thought a recent estimate that the costs of photovoltaics would fall by 80 percent by 2004 was too optimistic. He speculated that a 50 percent decline over ten years might be more realistic.

### **PLENARY II: ENABLING FRAMEWORK ISSUES FOR ATTRACTING INVESTMENT FOR RURAL ENERGY**

On Monday, 11 December, Plenary II session Chair Charles Feinstein, World Bank, explained that participants would hear presentations and engage in discussions on enabling framework issues for attracting investment in rural energy. He also drew attention to the Village Power 2000 meeting held from 4-7 December 2000 in Washington DC, which developed a series of goals, including bringing energy to 300 million consumers over the next decade.

**PRESENTATIONS:** Albrecht Reuter, Division Manager, Energy and Grid Management, Verbundplan, provided an investor’s perspective on enabling framework issues for attracting investment for rural energy. He said electrification can increase the overall efficiency of energy systems and so contribute to sustainable development. On policy challenges, he said governments should provide predictable macroeconomic and environmental policy frameworks to attract investment, and must reduce market risks and transaction costs. He said sustainable energy technologies could be encouraged by withdrawing subsidies for

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conventional fossil fuels and including externalities in energy prices. He also highlighted the need for technology transfer and said the Kyoto mechanisms could play an important role in this regard.

Ernesto Lima, Superintendencia General de Electricidad y Telecomunicaciones, El Salvador, presented the government's experience in reforming its electricity generation sector. He said the government was responsible for electricity production and distribution until privatization began in 1996. However, he suggested that privatization has done little to encourage rural electrification programmes, since distribution companies focus on existing infrastructure and commercial services. He said the Fondo de Inversión Nacional en Electricidad y Telefonía (FINET) had been established in the late 1990s to promote and manage financing of new electrification programmes. He noted the need for, *inter alia*: a clear strategy, innovative financing mechanisms, political support, leadership, project identification procedures and encouragement by FINET for financing agencies to support rural electrification.

In response to a participant's question, he said the keys to the success of the reform process included privatization and maintaining government control of hydroelectricity production and transmission. On lessons learned, he said appropriate regulatory agencies and experience are prerequisites for privatization, and that the obligation to serve should be included in the privatization legislation.

Christian Stoffaës, Electricité de France, presented the rural electrification experience of the E7 group of major electricity companies (Edison International, Enel, Electricité de France, Hydro-Québec, Kansai Electric Power Company, Ontario Power Generation, RWE Group and Tokyo Electric Power Company). He highlighted the need for a new approach based on social trust. This involves a partnership between companies and communities that enables all stakeholders to be involved in and benefit from the process and reduces costs in the long term. He said rural electrification must be economically and financially viable and linked to development. The costs and benefits should be assessed based on development benefits, such as avoided rural-urban migration. He noted the importance of capacity building to enable people to pay for, use and maintain the commercial energy system. He said the goal of access to electricity for all could be achieved within five years.

Martin Handrich, Bank Austria Energy Team, presented a bank's perspective on investing in developing country energy infrastructure. He explained that, unlike development banks, commercial banks are responsible to shareholders and investors for returns on their investment. He said barriers or disincentives to investment include inconsistent energy sector performance and inappropriate project structures and risk-sharing arrangements where country political risk is high. He suggested that governments could improve the investment climate through market liberalization, privatization, unbundling of production from distribution, elimination of energy subsidies, respect for the rule of law, and facilitation of consumer choice. However, he noted that privatization and liberalization by themselves do not provide a complete solution. Stating that much of the world gets its electricity from large power plants far from consumers, he said off-grid solutions are becoming cost-effective and highlighted the importance of tailoring solutions that take into account specific local circumstances.

**DISCUSSION:** In the ensuing discussion, a participant from Burundi's Ministry of Energy and Mines stated that capacity to pay should not be the requirement for energy access. Highlighting economic constraints in many countries, he said every person has a right to access electricity. A World Bank representative emphasized the importance of maximizing consumer choice, and said the Bank had in the past been

too specific in some cases in trying to mandate a particular technological choice. In response to a question on sources of funding if private sector investment is inadequate, Christian Stoffaës replied that one source may emerge by linking development objectives to global environmental objectives, through instruments such as the Kyoto mechanisms.

In response to a request from session Chair Charles Feinstein for clarification on additional investment for rural energy, José Goldemberg noted that investments in rural energy already total \$30 billion per year, but said the challenge is to find an additional \$30 billion per year by making it attractive for the public and private sector to invest. Several participants noted that the energy sector is substantial and investment-intensive, and stated that while the resources exist, the right investment structures and political will are necessary to mobilize them. A number of participants pointed out that early in the 20<sup>th</sup> Century, cross-subsidies were used in industrialized countries until the income generation resulting from the availability of electricity was sufficient to enable consumers to pay. The discussion also raised the possible lesson to be drawn from the widespread use of wireless telecommunications technologies in rural areas.

In response to a comment from the floor, Albrecht Reuter cautioned against classifying technologies as either good or bad, and highlighted specific purposes and situations affecting appropriate energy sources. Pointing to the existence of some "hidden agendas" in aid and development assistance, one participant referred to energy projects that involve installation of high-technology goods from Northern suppliers, which might erode the positive impact of development funds. He said it was important to identify a methodology for identifying solutions, rather than seeking to provide solutions. Another participant raised issues relating to energy demand, noting that it was necessary to separate monetised and non-monetised demand and that rural areas are not homogeneous. She highlighted the potential role of consumers in articulating demand, noting the role of consumer groups in the electrification of North America. In addition, a number of speakers noted that energy system planning should be needs-driven, rather than technology driven.

### PLENARY III: LESSONS LEARNED

On Monday afternoon, 11 December, Per Almqvist, Swedish Ministry of Foreign Affairs, chaired the Plenary session on Lessons Learned, noting that there would be seven presentations on specific case studies.

**PRESENTATIONS:** Rob Stephen, Consultant, ESKOM, discussed rural electrification in South Africa. He outlined a programme that had electrified 1.75 million households from 1995-1999, mostly in rural areas, simultaneously reducing costs per connection by more than 50 percent in real terms. He said the programme was the result of a compact with government. Factors contributing to the programme's success included social interventions such as electrification committees, a process that evolved with experience and changing circumstances, and technical interventions. He said clear goals and objectives were needed, as well as a holistic approach.

Youba Sokona, Environnement et développement du tiers-monde (ENDA-TM), Senegal, discussed the introduction of the Liquefied Petroleum Gas (LPG) Programme in Senegal, which set out to substitute LPG for charcoal. He said measures to support this programme include the design of gas stoves to meet local needs, removal of taxes on imported equipment, and a price policy aimed at making LPG more affordable. LPG consumption increased from less than 3,000 tonnes in 1974 to almost 100,000 tonnes in 1999. He said lessons learned include

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the impact government policy can have on fuel consumption patterns, and the fact that LPG expansion has not resulted in the disappearance of traditional fuels such as charcoal, although it has diversified energy sources.

Laurent Coche, Regional Coordinator, UNDP, discussed the Multi-functional Platform concept for energy developed in Mali. He said the Platform seeks to address poverty among rural women by providing a simple source of energy – a basic diesel engine that can power a variety of different tasks, including cereal grinding, dehusking and carpentry, as well as generate electricity for pumping water, lighting, welding and charging batteries. He said the simplicity, sturdiness and multiple applications of the engine provides a positive example of appropriate multi-functional technology.

Cahit Gurkok, UN Industrial Development Organization (UNIDO), outlined UNIDO's sustainable rural energy programme. He provided information on technical cooperation projects relating to: a Multipurpose Platform for rural energy development; fuel wood replacement and briquetting; charcoal production from wood waste and cotton stalks; biogas production; integrated biosystems; photovoltaics for solar power; micro- and mini-hydro power; the application of advanced techniques, such as remote sensing, for mini-hydro development; wind energy applications; and hydrogen energy for rural development. He highlighted the potential of high-end technologies.

Ronald Bowes, US Department of Energy, described the Energy Efficiency 21 Programme in the Balkans. He noted problems such as blackouts, heating fuel shortages and air pollution faced by cities including Sofia, Skopje, Bucharest and Belgrade. He explained that the programme operates at the regional, national and local levels and involves governments, municipalities, utilities, the private sector and key non-governmental organizations. An internet service based in Sofia connects municipalities, with the aim of creating a critical mass of projects and providing information to investors.

Gustavo Best, Senior Energy Coordinator, UN Food and Agriculture Organization (FAO), presented a case study of biofuel production from bagasse and eucalyptus at a sugar mill in Nicaragua. He said the project combined forestry, agriculture, energy and environmental elements. Key lessons included the importance of integrating stakeholders into the project, conducting technical and economic analyses, maintaining support for the initiative through information dissemination and selecting the appropriate fuel alternative. The study demonstrated, *inter alia*, the need to avoid land competition between energy and food production.

Sonam Tshering, Ministry of Trade and Industry, Bhutan, made a presentation on small hydropower in the Himalayas, focusing on Rangjung hydro power in Eastern Bhutan. The project aimed to provide rural electrification and had a number of other social and environmental objectives, including reducing rural to urban migration, improving people's health and reducing fuel wood consumption. Lessons learned included the need to encourage community participation, the importance of engineering studies on the hydrological regime of the river in order to ensure optimum project design, and the benefits of rural electrification to women's health and quality of life, education standards and the local economy.

### OVERVIEW OF DAY I: PLENARY SESSIONS I - III

On Tuesday morning, 12 December, Forum Rapporteur Lee Solsbery, World Business Council for Sustainable Development (WBCSD), provided a synopsis of key issues discussed in the Plenary sessions held on 11 December. He noted a clear diagnosis of the problems relating to

rural energy and said there appeared to be a strong feeling that this meeting should outline a concrete approach and recommend actions for addressing these problems. He said key points relating to the diagnosis included that: energy is critical for achieving sustainable development and is not simply a sectoral issue; clean affordable energy supports a range of development goals; almost two billion people are without access to non-traditional energy; an additional US \$30 billion per year in investment is required between now and 2020 to address this problem; new methods must be found to bring adequate sustainable energy to developing countries through appropriate technologies and increased efficiency in production and end-use applications; obstacles include issues of cost and the need to leverage significant new private investment; and public finance can play a key role.

He then identified a number of practical factors that should be addressed, including market reform, pricing and payment structures for rural energy, the low income of many without access to energy, and the challenge of matching local affordability to the commercial need to achieve adequate returns. Technical issues requiring attention included the need to make photovoltaics more affordable, commercialize micro and mini hydro, and train local people in technology application and operation.

Lee Solsbery also listed key policy issues, highlighting: adequate funding of the Global Environment Facility (GEF), official development assistance (ODA) and other public sources; cooperation and communication among actors from key sectors; public money and regulatory reform to stimulate commercial investment; and different countries' specific situations and needs. Finally, he listed priority actions, including identifying areas where energy demand can be monetised, creating the right framework conditions for private investment with public partnerships, and assuming greater penetration of private money in markets where commercial conditions are likely to be robust. He said remaining needs could be addressed through public finance or concessional approaches.

In the subsequent discussion, one speaker underscored the importance of political will in making progress. Responding to a question about the sources of funding, Lee Solsbery noted a variety of funding options and drew attention to the Clean Development Mechanism (CDM) of the Kyoto Protocol to the UN Framework Convention on Climate Change as a new source.

### PLENARY IV: FINANCING ISSUES

This Plenary session convened on Tuesday morning, 12 December, and was chaired by Richard Ballhorn, Department of Foreign Affairs and International Trade, Canada.

**PRESENTATION:** Ken Locklin, Energy Investors Funds (EIF) Group, provided an investor's perspective on financing for rural energy. He noted the opportunities for investment in small-scale rural energy services. He said small projects must address high risks, significant up-front and transaction costs, externalization of environmental benefits, and limited local entrepreneurial capacity. Solutions to these obstacles include: blending funding sources; using proven technologies and suppliers as well as strong partners; standardizing documents and underwriting criteria; and seeking niche markets, concessionary support, and carbon credits. He said the EIF Group has adapted project finance and risk management to small-scale projects, with the aim of achieving an overall rate of return comparable to that of conventional energy. He outlined the Renewable Energy and Energy Efficiency Fund (REEF) that invests in commercial scale projects in 34 countries. A key challenge is to assist rural energy delivery companies (REDCOs) in

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non-commercial scale projects. He cited the example of E&Co, an energy investment service that assists REDCOs. To underline the problem of scale, he said REDCOs will achieve critical mass when they collectively service 60 million households. Assuming a single REDCO can service 1000 households, there is a need for 60,000 such companies. About 30,000 of them may require outside assistance. If an energy investment service can reach 300 REDCOs, at least 100 energy investment services are needed; E&Co is only one of them.

**DISCUSSION:** In the subsequent discussion, a participant highlighted the investment bias toward high-technology renewables even where local alternatives, such as biomass, exist. It was noted that the private sector uses technologies that make commercial sense and investors spread resources across a range of technologies. In response to a question on enabling frameworks, Ken Locklin said transparency, low transaction costs and government acceptance of private investment are important. On sustainability of projects, participants noted the need both to integrate lessons learned into local institutions, and to avoid creating an expectation of free energy among consumers, which undermines the efforts of local entrepreneurs.

**PRESENTATION:** Charles Feinstein, World Bank, focused on subsidies and sustainable rural development. He said a challenge is to create incentives without distorting markets, and argued for temporary, well-designed subsidies for rural energy. New models for intervention, such as Chile's Rural Electrification Fund, are promising. He noted that poor people spend 10-20 percent of their income on energy, whereas the wealthy spend two percent. Subsidies can be appropriate where they leverage large welfare gains. A case study of the Photovoltaics Market Transformation Initiative (PVMTI) in India, Kenya and Morocco demonstrated the usefulness of subsidies, which increased the profitability of 13 projects by an average of five percent. He said undesirable subsidies are those that: provide an implicit reward for non-payment; are untargeted and indiscriminate; drain scarce public resources; and destroy commercial incentives. Subsidies should reach the poor and target access costs rather than consumption. He provided information on the Energy Sector Management Assistance Programme (ESMAP) and the Village Power 2000 conference held from 4-7 December, 2000.

**DISCUSSION:** The subsequent discussion focused on the sources and purposes of subsidies. Participants noted that subsidies should: leverage, not crowd out, private funds; correct market failure and promote eventual economies of scale; expand the options available to consumers who are paying more than they should for poor quality energy; be transparent and not open-ended; and be temporary and involve an exit strategy to avoid creating dependence.

Several respondents asked for elaboration from Charles Feinstein on his conditional support for energy sector subsidies, in the light of the World Bank's standard loan conditions of market liberalization and general subsidies elimination. Feinstein explained that subsidies for development directed toward industries from the North would not be supported by the Bank, and that the same approach would apply to any subsidy that undermined market potential. He noted that renewable energy projects do not go forward unless rates of return are comparable to those of conventional options such as diesel or kerosene. He also highlighted some World Bank efforts – such as in Chile, Uganda and Zimbabwe – that have included the establishment of rural electrification funds.

**PRESENTATION:** Philip Mann, European Commission, presented a donor's perspective on energy. He outlined the Commission's new development policy, framed in terms of poverty reduction and social and environmental goals. He stated that energy is an issue common to

all six strategic areas of the new policy, which are trade, regional integration, macro-economic support and social sectors, transport, sustainable rural development and good governance. However, energy is not singled out for separate treatment. He said promoting energy as a means for development is often best achieved through leveraging funds in partnership with private sector firms and civil society, and focusing on energy projects in support of education, water supply, prevention of rural migration and other development needs.

**DISCUSSION:** Several participants urged that the provision of energy services be needs driven, involving beneficiaries in technology choices, rather than tied to a particular technology. Charles Feinstein underscored the difficulties that renewables face in attracting investment due to their high initial outlay and benefits that accrue slowly over their lifecycle, factors that are not competitive for investors with high discount rates. Means for offsetting these difficulties include partial credit guarantees and "take-out financing." While investment tax credits and accelerated depreciation are used in developed countries to support energy efficiency investments, Feinstein pointed out that barriers to energy efficiency investment are due to information asymmetry and transaction costs, not economic fundamentals.

### ***PLENARY V: CHALLENGES AND OPPORTUNITIES OF REGULATORY REFORM***

This Plenary was held early Tuesday afternoon, 12 December, and was chaired by Wim Tirkenburg, Faculty of Chemistry, Utrecht University, who emphasized the need for an appropriate regulatory framework and introduced the two presenters.

**PRESENTATION:** Peter Fraser, International Energy Agency, made a presentation on electricity market reform in the OECD. Noting that the process of energy market liberalization had started in most OECD countries in recent years, he outlined the benefits of liberalization, including increased economic efficiency. He then outlined causes of liberalization, features of reforms, preliminary conclusions in terms of impact on consumers, and the changing role of government, including the emphasis on independent regulation. He also highlighted the significant impacts of liberalization on public policies relating to energy security, pollution control, renewables and cross-subsidies. In terms of rural consumers and liberalization, he noted the high costs per kilowatt hour, cross subsidization, and the opportunity for subsidy reform to provide incentives for investment in more cost-effective solutions. On lessons from the OECD experience, he highlighted the need to: elaborate a clear policy and legal framework; restructure companies and initiate price reform prior to liberalization; empower the end user; and ensure effective independent regulation. On the implications of reform, he drew attention to the emergence of new private, global players, new technologies, and the need for innovative institutions and mechanisms for meeting public policy objectives and promoting investment.

**DISCUSSION:** In response to a question on the impact of liberalization on renewables, Peter Fraser said there had been a greater focus on renewables as a result of reform. He noted, however, that energy utilities had traditionally conducted most research and development, and questioned who would engage in such activities in the future.

**PRESENTATION:** Moses Zama, Energy Regulation Board, Zambia, described energy sector regulatory reform in Zambia. He said reforms should expand public access to energy and help meet rural development needs. The policy environment and legal framework must be clear, stimulate investor confidence, and promote autonomy and accountability of regulatory bodies and energy enterprises. He

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explained that the Energy Regulation Board, established in 1995, uses license-based regulation and is funded by fees paid by companies and grants from donors. The decision-making process reflects the importance of transparency, independence, stakeholder input and external communication. He emphasized the role of capacity building and learning by doing. He said the way forward involves: enhancing regulatory independence, improving regulation, increasing consumer participation in the energy sector and supporting sustainable rural and peri-urban development.

**DISCUSSION:** Participants then discussed: the need for competitive tariffs and the potential for tariff differentiation to enable cross-subsidization; the licensing requirement that companies explain how they will make profits and expand the grid; and the advantages of liberalization in reducing risk. A participant pointed out the challenge of attracting investment in rural areas in countries with depreciating currencies, high inflation and decreasing income. Moses Zama noted that, as a first step toward unbundling the electricity monopoly in Zambia as part of liberalization, the Energy Regulation Board requires it to report separately the different parts of its business.

### **OVERVIEW OF DAY 2: PLENARY SESSIONS IV & V**

On Wednesday morning, 13 December, Forum Rapporteur Lee Solsbery, WBCSD, provided a synopsis of key issues discussed in the Plenary sessions held on 12 December. He drew attention to technical, practical and policy issues to be addressed, and noted that increased private investment will only occur in markets where commercial conditions are robust, which will have implications for immature markets. He also noted participants' comments on: the use of public money and regulatory reform to help reduce prices and stimulate investment in growing developing country commercial markets; the need to tailor solutions to different situations; the idea that public finance, including appropriate subsidies, should be required when commercial grade investments are absent; and the question of how export credit agency lending can promote sustainable energy technologies to reach rural areas.

He then identified a range of suggested priorities including:

- adopting a two-pronged strategy with private and public elements;
- leveraging public funds to create functioning private markets in developing countries' energy sectors;
- establishing a "political risk co-finance facility" to address investment barriers in developing countries;
- encouraging developing countries to introduce regulatory systems to promote rural energy access;
- mobilizing credits under the CDM to add a new revenue stream;
- providing seed capital and enterprise development;
- supporting a new Donor Pledge to target funds to leverage market changes and avoid competition with private funding;
- supporting donor meetings to target rural energy and discuss the appropriate role of subsidies;
- avoiding the "one size fits all" approach and applying tools as appropriate;
- inviting key private sector representation into the UN Intergovernmental Coordination process;
- using donor coordination groups to define and implement Export Credit Agency policy addressing rural needs;
- agreeing on a concrete action plan at CSD-9;
- agreeing on the aim of halving as soon as possible the number of people without access to modern energy;

- considering appropriate transition approaches to facilitate sustainable energy paths; and
- utilizing synergies between greenhouse gas reduction strategies and modern energy services.

### **PLENARY VI & REGIONAL GROUP SESSIONS: ENABLING FRAMEWORK ISSUES, FINANCING AND REGULATORY QUESTIONS**

On Tuesday afternoon, 12 December, participants divided into three parallel regional break-out groups to consider enabling framework issues, financing and regulatory questions from a regional perspective and regional priorities and opportunities. The follow-up to these regional group sessions took place on Wednesday morning, 13 December, when participants met in Plenary to hear reports from these regional group sessions.

**AFRICA:** On 12 December, the regional group session for Africa was opened by Facilitator Stephen Karekezi of the African Rural Energy Enterprise Development Initiative. He presented his organization's experience in assisting entrepreneurs in the energy sector while mitigating climate change. Challenges included widening access, scaling up successes and stimulating markets. He said energy systems should reduce inequity, attract investors, protect the environment and work with national policies and through partnerships between non-governmental organizations, public and private sectors.

Participants examined the factors essential to successful rural energy service provision and the difference between this and rural electrification. They discussed various energy technologies and their merits, the need for analytical work and pilot efforts, the use of energy to stimulate local production, and the value of learning from and harnessing the informal sector.

On finance, participants noted that rural energy provision in Africa requires adequate, sustained funding that is unlikely to be provided entirely, or even largely, by the private sector. Some participants suggested that local resources and microcredit could readily be mobilized, while others noted that national monopolies are more likely than privatized electricity generators to invest in rural electrification and energy efficiency. It was noted that, while ODA will play a critical role, new sources of funding – such as the GEF and CDM – will be required. Participants also acknowledged the potential of access subsidies, user fees and public-private partnerships.

On national energy policies, they stressed bottom-up approaches based on local needs, political will and coherent institutional and legal frameworks. The possibility of establishing a rural energy agency was raised. In addition, participants underlined the need for information dissemination and capacity development related to policy making, entrepreneurial skills, technology transfer and learning from other projects and sectors.

In Plenary on 13 December, Session Rapporteur Youba Sokona, ENDA-TM, summarized this discussion, emphasizing the critical roles of institutions and public finance.

**ASIA:** R.K. Pachauri, Tata Energy Research Institute, facilitated the regional group on Asia, which met on 12 December. He characterized Asia as an extremely diverse region with one billion people who lack sufficient energy and face significant policy, financial and technical constraints. Participants emphasized that energy should form part of an overall development strategy that expands access to markets, enhances living conditions and boosts income. They then discussed the experiences of Pakistan, India, Bhutan, Indonesia, Thailand, Papua New Guinea and Kiribati. They discussed the importance of local contexts in

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determining the mix of public and private sector funding, community consultation and capacity building, and consumer ownership or payment for electricity. It was noted that Asia is characterized by a large domestic business sector, high overall population density with large sub-regional variations, and the existence of a grid in many rural areas that is not serving communities. It was noted that opportunities exist for connecting rural electricity sources, such as micro-hydro, to the grid and selling surplus electricity.

R.K. Pachauri then outlined a five-pronged framework for rural energy comprising microfinance, local government structures, technology selection, regulatory and policy frameworks, and private sector involvement. On microfinance, participants stressed: the need for innovative mechanisms; distribution of risk, including among governments, banks and local cooperatives; the role of government in promoting an enabling environment and of non-governmental and intergovernmental organizations in delivery; minimization of overhead and direct access to funds; and the need for the community to share the financial burden.

During the discussion on structures, several participants suggested that local entrepreneurs were the primary actors. They highlighted the need for training and support of local-level entrepreneurs to create businesses, local capacity and leadership. A participant cited the examples of Coca-Cola and Pepsi, which maintain efficient supply and distribution networks even in remote areas.

On the role of technology, participants discussed the need for demonstration and pilot projects to facilitate objective comparisons between technologies and the importance of understanding local needs. They stressed that rural electrification should be accompanied by a comprehensive economic package including telecommunications, health care and training. This necessitates cooperation at all levels and among several ministries.

On regulatory structures and enabling policies, participants underscored the role of economic and fiscal incentives, the importance of appropriate regulations and the need to sensitize governments to the benefits of such policies.

On private sector involvement, participants underlined the need for an adequate rate of return on energy investments and the role of public financing in stimulating private investment. Exchange rate fluctuations and country risk often inflate the required rate of return for an outside investor to as much as 45 percent. There is a need to attract local companies, which might not be so constrained by these factors.

It was noted that multinational investors may be trading immediate returns for longer term consolidation of market access and value from environmental branding. Rapporteur Jayarad Gururaja, UNDESA, summarized this discussion in Plenary on 13 December.

**LATIN AMERICA AND THE CARIBBEAN:** This regional group met on 12 December and was facilitated by Roberto Macedo, University of Sao Paulo, Brazil, who outlined Brazil's experience with LPG use for cooking. This technology has an extremely high market penetration, with LPG stoves in 97 percent of households. He suggested that the popularity of LPG can be attributed to portability of bottles, high safety standards, convenience compared to wood, affordability and an excellent distribution network. Participants noted the need for a national framework in introducing LPG, and that LPG use should be viewed as a transitional step towards sustainable energy. Monica Servant, Technical Assistance Manager, Ministry of Economy, Argentina, made a presentation on energy privatization in Argentina and its impact on renewable energy. She discussed the aims, methods, structures and outcomes of privatization, paying particular attention to rural electrification.

In the discussion that followed, participants stressed that: energy initiatives require a consultative process; a strong, competent and independent regulatory framework is needed; privatization should promote rather than hinder sustainability; and a social dimension is essential. Participants also highlighted the need for solutions based on individual circumstances. Financing, subsidies and funding issues were discussed at length, with one suggestion that national governments establish entities to channel external resources such as GEF funding. The potential role of the CDM was highlighted. Participants also discussed the role of the UN and of CSD-9 in developing rules or principles governing rural energy. Key messages from the group included the view that no single model fits all circumstances, rural energy issues cannot be addressed in isolation, and peri-urban areas and the interfaces between rural, peri-urban and urban areas should be considered. It was also noted that governments should promote rural development at the political level. At an international level, there was call for a global energy charter or codex on rural energy, with the first step being the establishment of a set of principles.

On 13 December, Rapporteur Gustavo Best, FAO, reported to Plenary on the Latin America and the Caribbean group session.

**DISCUSSION:** In the discussion following the reports of the regional sessions on 13 December, participants identified common elements from the three workshops, notably: a focus on rural energy services rather than simply rural electrification; the need to integrate energy services within a broader development approach; and the importance of community needs and input.

One participant cautioned that development of a world energy "charter" might be premature and favored a more flexible "codex" style approach based on agreed principles.

Participants debated whether the emphasis on integrating energy and development risked undermining the importance of energy and detracting from investment in this sector. It was noted that in Asia, bundling energy services with other development services has proven cost effective. Experience in Africa showed that focusing only on electrification, and failing to consider other aspects of development, did not reduce poverty levels. It also demonstrated a need to align energy strategies with other services such as water. One participant suggested that, since national governments have a responsibility to provide energy, they should contribute a portion of the costs as a means of leveraging funding from other sources.

Following this discussion, Burkhard Holder, International Solar Energy Society (ISES), gave a presentation on ISES' project on Exemplary Models for Energy Supply of Rural Areas Using Renewable Energy. He stated that in most rural areas, grid extension is not a viable option, as it is too expensive for low consumption loads. He suggested that decentralized solutions, such as solar home systems, were more appropriate. He outlined five approaches to financing: cash purchase, credit purchase, leasing, fee for service and pilot projects.

### **PLENARY VII: INNOVATION**

The session on "Innovation" took place on Wednesday, 13 December. Session Chair Kurt Yeager, Electric Power Research Institute, opened the meeting and introduced the presenters.

**PRESENTATIONS:** Larry Kohler, International Council for Science, made a presentation on institutional innovation. Noting that technological constraints are seen as more urgent than institutional constraints, he stressed that institutional innovations are nevertheless essential for adapting and disseminating existing rural energy technologies. He supported examining institutional roles, capacities and

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constraints and assessing changing institutional needs as part of the CSD process. He also called for innovations within existing institutions, and said new institutions should be established only when absolutely necessary. He said the scientific community should enhance its role in the transfer of scientific and technological information and the development of local scientific capacity. He confirmed that the International Council for Science is ready to build on the CSD-9 experience and expressed support for a new energy-related scientific research initiative to support sustainable rural energy objectives.

Nebojsa Nakicenovic, Project Leader, Transitions to New Technologies, IIASA, discussed technological change in relation to rural energy systems. He considered scenarios for the year 2070 in terms of technology development and diffusion and rural energy use, noting the continuation in some cases of traditional energy sources in rural areas. He outlined stages of development referred to in the World Energy Assessment, namely research and development, use of demonstration projects, early deployment and widespread dissemination.

Stressing that 1.5 billion people live on less than one dollar per day and that technology diffusion takes at least 20 years, he said efforts to “leapfrog” rungs of the energy ladder should aim to “jump to the top” of this ladder. He said minimizing the distinction between rural and urban diffusion would be helpful. Recommended actions include capacity building and ensuring an appropriate environment and necessary mechanisms for private and public technology transfer activities.

Andrei Marcu, International Emissions Trading Association, discussed rural electrification, which traditionally has been a state-sector activity. Unbundling, deregulation, globalization, privatization and technological changes allowing decentralization and lower levels of capitalization have led to a redefinition of the role of the state. He said rural electrification is not profitable and necessitates new mechanisms including: combining rural electrification with rural telecommunications, targeting demand and supply, and using the CDM. He cited case studies in which revenues from Certified Emissions Reductions reduced project costs by 2-20 percent, depending on the ultimate cost per tonne of CO<sub>2</sub>. He suggested that the road ahead will involve improving institutions; removing subsidies on some energy sources; optimizing regulatory frameworks; removing the CDM levy for rural electrification projects; quantifying the environmental benefits; and building capacity.

**DISCUSSION:** In the ensuing discussion, a participant asked for elaboration on the convergence of technology transfer and diffusion. Nebojsa Nakicenovic said both are critical and noted the value of economies of scale and market size in diffusing technologies. Participants also highlighted the need for capacity to address regulatory issues. On a question relating to energy technology leap-frogging, Andrei Marcu cautioned that it should not be carried out indiscriminately. A participant from Indonesia noted her country’s experience in privatization of the electricity sector, where rural electrification ultimately remained in government hands because it was unprofitable. Nebojsa Nakicenovic cautioned against a centrally-planned approach. He said it is crucial to invest enough resources to enable the players to implement options in a decentralized way.

Kurt Yeager concluded by underscoring the potential for innovation, saying it requires a new vision, political will and enlightened self-interest on the part of developed countries. He remarked that \$30 billion is less than the world spends on cigarettes, so is not an unreachable target. Universal electrification should be an immediate priority, since the two billion people currently without electricity could become five billion by 2100. He said old technology will “doom communities and economies to obsolescence,” and advocated using electrification to

bring people into the digital economy. The technology of the new economy is efficient and can provide a platform for assimilating into the global economy at whatever level suits the local community. He concluded with a quote from a wall of the US House of Representatives: “Where there is no vision, people perish.”

### CLOSING PLENARY

The final Plenary convened Wednesday afternoon, 13 December. Participants heard concluding remarks from a panel and discussed the key messages and outcomes of this meeting, the way forward, and a future work plan for the GFSE.

Irene Freudenschuss-Reichl, Ambassador, Permanent Mission of Austria, opened the final Plenary and drew delegates’ attention to Rapporteur Lee Solsbery’s synopsis of key issues raised. She said the Rapporteur’s final report of the meeting and this IISD *Sustainable Developments* report would form the written outcomes of the meeting and would be distributed at CSD-9 and other relevant upcoming meetings. She highlighted some of the issues raised, including the view that a two-pronged approach involving the private and public sectors is required. She also noted a clear sense that strategies for rural energy would dovetail with strategies to curb greenhouse gas emissions. Text written by Thomas Johansson, UNDP, was distributed proposing a target of reducing the number of people without access to affordable clean fuels and electricity to a maximum of 500 million by 2015. Irene Freudenschuss-Reichl then invited the panelists to comment on key issues raised during the Forum.

**PANELISTS:** Khandu Wangchuk, Ministry of Trade and Industry of Bhutan, highlighted poverty elimination as a major goal and said sufficient and affordable access to energy can have an impact. He noted the far reaching consequences of rural electrification, the extensive debate at this meeting on ways and means to address rural energy issues, and the sentiment expressed by many participants that solutions must fit local needs. He called on the international community to support LDCs and developing countries in their efforts to provide energy for the rural poor.

Raj Puri, BP, said this meeting had been an excellent learning experience and highlighted the role of the private sector. Noting private sector concerns about the lack of profitability from its current involvement in this area, he said business nevertheless recognized that the future lay in providing sustainable energy – the issue was simply how to achieve this cost-effectively. He said synergies that tap into current company infrastructure and activities could be developed.

Philippe De Renzy Martin, Shell Solar, drew attention to three key actors in sustainable energy: local government, local marketing operations and offshore multilateral and bilateral subsidy providers, whose processes he said should be streamlined. He noted that not everything could be achieved at the same time and urged that progress be made where and when possible.

Thomas Johansson, UNDP, stated that the basic idea behind this meeting had been to establish a stronger dialogue among stakeholders, and said discussions had been productive. He praised Rapporteur Lee Solsbery’s list of actions, suggesting that several actions should be prioritized from the long list, for instance, the reference to bringing new technologies to bear and tackling the very low incomes in rural areas of developing countries. He also noted that leapfrogging is both a technological and institutional issue.

**DISCUSSION:** Participants discussed the question of setting specific rural energy targets. One speaker stated that reaching 1.5 billion people in 15 years is a significant undertaking given finite resources,



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and supported a bottom-up approach that would allow developing countries to list their rural development priorities. However, an alternative view was that an additional \$30 billion investment had to be considered in the light of current annual investments in the energy sector of \$300 billion. Participants also considered the respective roles of the public and private sectors, with one speaker reinforcing the critical role of the public sector and the need to increase ODA levels.

Delegates also reiterated a number of specific issues, including: the potential role of LPG in providing for some of the basic needs of the rural poor; the need for clear language on the "new role" of ODA as a catalyst for private sector investment; the benefits of a clear focus on rural energy and the potential role of an inter-agency body or secretariat to coordinate work in this area; and the view that both conventional energy and renewables should form part of the solution.

**CLOSING REMARKS:** Irene Freudenschuss-Reichl thanked participants for their participation and encouragement. On the future work of the GFSE, she said the topic for the next meeting would be decided after CSD-9, and requested suggestions and feedback. One possible topic was the issue of technology transfer and the roles of FDI and ODA. She also suggested establishing a formal Advisory Board for the process and invited participants to submit nominations. She thanked partners and funders, including the Swedish and Norwegian governments, the LEAD Foundation and the Austrian Development Corporation, for sponsoring the meeting and enabling a high level of participation from developing countries. Finally, she thanked IIASA for hosting the meeting and the people who had provided suggestions for speakers.

In response to a request for clarification on the nature and mandate of the GFSE, Thomas Johansson said it provides a neutral forum for promoting stakeholder dialogue and informing the intergovernmental process, and its recommendations need translation into country-level plans. Irene Freudenschuss-Reichl added that some participants had suggested applying the GFSE model to a regional setting and that the GFSE was working with other processes to avoid duplication. Thomas Johansson thanked Irene Freudenschuss-Reichl for her work in convening this meeting, which closed shortly after 2:00 pm.

### THINGS TO LOOK FOR

**EECO 2000 - ENVIRONMENT AND ENERGY CONFERENCE: BUSINESS STRATEGIES FOR SUSTAINABLE ECONOMIC GROWTH:** This conference will be held from 29-30 January 2001 in Toronto, Canada. For more information contact: Globe Foundation of Canada, Vancouver, BC: tel: +1-800-274-6097 (in Canada or the US); fax: +1-604-666-8123; Internet: <http://www.eeco2000.com>

**SIXTH INTERNATIONAL CONFERENCE ON SOLAR ENERGY AND APPLIED PHOTOCHEMISTRY:** This meeting will be held from 3-8 April 2001 in Cairo, Egypt. Lectures and workshops will help scientists to communicate and share experiences on solar energy issues. For more information contact: Sabry Abdel-Mottaleb, Photoenergy Center, Faculty of Science, Ain Shams University,

Abbassia, Cairo, Egypt; tel: +2012-216-9584 (mobile); fax: +202-244-7683; e-mail: [solar@photoenergy.org](mailto:solar@photoenergy.org); Internet: <http://www.photoenergy.org/solar2001.html>

**12TH GLOBAL WARMING INTERNATIONAL CONFERENCE & EXPO - KYOTO COMPLIANCE REVIEW:** This meeting will be held in Cambridge, UK, from 8-11 April 2001. For more information, contact: Sinyan Shen, The Global Warming International Center Headquarters, Naperville, Illinois, USA; tel: +1-630-910-1551; fax: +1-630-910-1561; Internet: <http://www2.msstate.edu/~krreddy/glowar/gw12c.html>

**CSD-9:** The Ninth Session of the Commission on Sustainable Development will be held in New York from 16-27 April 2001. This session will focus on: atmosphere; energy/transport; information for decision making and participation; and international cooperation for an enabling environment. The topic of the multi-stakeholder dialogue segment will be energy and transport. Prior to CSD-9, intersessional meetings will be held from 26 February - 2 March (Energy Expert Group), 6-9 March (Working Group on transport and atmosphere) and 12-16 March (Working Group on information for decision-making and participation and on international cooperation for an enabling environment). For more information contact: Zehra Aydin-Sipos, Major Groups Focal Point, Division for Sustainable Development; tel: +1-212-963-8811; fax: +1-212-963-1267; e-mail: [aydin@un.org](mailto:aydin@un.org); Internet: [http://www.un.org/esa/sustdev/csd9/csd9\\_2001.htm#](http://www.un.org/esa/sustdev/csd9/csd9_2001.htm#)

**CSD-10 (PREPCOM):** The Tenth Session of the Commission on Sustainable Development is expected to convene for a meeting in New York from 30 April - 2 May 2001 to serve as the Preparatory Committee for the Ten-year Review of UNCED. For more information contact: Zehra Aydin-Sipos, Major Groups Focal Point, Division for Sustainable Development; tel: +1-212-963-8811; fax: +1-212-963-1267; e-mail: [aydin@un.org](mailto:aydin@un.org)

**THIRD UN CONFERENCE ON THE LEAST DEVELOPED COUNTRIES:** This meeting will be held from 14-20 May 2001 in Brussels, Belgium. An Intergovernmental PrepCom for the event will be held from 5-9 February 2001 in Geneva. For more information contact: Office of the Special Coordinator for Least Developed, Landlocked and Island Developing Countries, UNCTAD, Geneva, Switzerland; tel: +41-22-907-5893; fax: +41-22-907-0046; Internet: <http://www.unctad.org/en/subsites/ldcs/document.htm>

**UNFCCC SB-14/RESUMED COP-6:** The 14th Session of the Subsidiary Bodies of the UN Framework Convention on Climate Change will take place from 21 May - 1 June 2001 in Bonn, Germany. This meeting may also serve as the resumed COP-6 (as outlined under COP-6 decision FCCC/CP/2000/L.3). For more information, contact: the UNFCCC Secretariat; tel: +49-228-815-1000; fax: +49-228-815-1999; e-mail: [secretariat@unfccc.int](mailto:secretariat@unfccc.int); Internet: <http://www.unfccc.int>

**UNFCCC COP-7:** This meeting is scheduled to take place from 29 October - 9 November 2001, in Marrakech, Morocco. For more information, contact: the UNFCCC Secretariat; tel: +49-228-815-1000; fax: +49-228-815-1999; e-mail: [secretariat@unfccc.int](mailto:secretariat@unfccc.int); Internet: <http://www.unfccc.int>