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Expert Meeting on Green and Renewable Technologies as Energy Solutions for Rural Development
Geneva, 9–11 February 2010

Report of the Expert Meeting on Green and Renewable Technologies as Energy Solutions for Rural Development

Held at the Palais des Nations, Geneva, from 9 to 11 February 2010

Contents

Introduction

1. The opening session of the Expert Meeting on Green and Renewable Technologies as Energy Solutions for Rural Development discussed the elements involved in catalysing rural development using green and renewable energy technologies (RETs). In particular, it was emphasized that energy was a driver of rural development. Therefore, RET deployment must be designed with those intended benefits and uses in mind.

I. Chair's summary

A. Summary of debate

2. In his opening remarks, the Secretary-General of UNCTAD, Mr. Supachai Panitchpakdi, highlighted the important catalytic role of RET deployment for the achievement of the Millennium Development Goals. He referred to two challenges: (a) the need for technology transfer and for building indigenous capabilities; and (b) the need for an integrated policy framework for pro-poor rural development strategies.

3. At the first informal session, the connection was acknowledged between energy poverty and lack of rural development. Discussion began on the role that RETs could play in reducing energy poverty in order to achieve rural development. The link between increased access to modern energy services and realization of the Millennium Development Goals was made explicit. It was noted that the absence of modern energy services contributed to the perpetuation of poverty and to environmental degradation, and also to a lack of access to quality social services (such as water, health and education) and to productive and job-creation opportunities. In spite of natural energy endowments in some developing countries, access to modern energy services was very limited in the rural areas of many of them.

4. Experts presented a variety of RETs, such as solar photovoltaic systems, solar water heaters, wind turbines, small hydropower systems, geothermal plants, improved cookstoves, biomass plants and biogas digesters. The advantages of using various RETs to increase access to affordable energy in rural areas were underlined. Decentralized RET systems could match local needs and circumstances – in terms of system size, the renewable energy sources available, and planned end use. Given the poor record of the grid electrification programmes of many developing countries in penetrating dispersed rural areas, the deployment and scale-up of RETs offered an alternative that was often more economic and more appropriate. However, it was noted that this was not necessarily an "either/or" situation; a decentralized sector with a focus on rural areas, which ran in parallel with the centralized grid system, could bring faster and more cost-effective economic development in developing countries. In addition, RETs could address local and global environmental concerns.

5. One expert noted that without access to electricity, rural populations would not be able to take advantage of the opportunities offered by productive services such as information and communication technologies (ICTs). Such ICTs include mobile phones – used in many countries for a variety of productive purposes such as money transfer, following market trends, and keeping abreast of weather patterns. All of these services can contribute to rural development but require reliable access to electricity. This catalytic effect of increased access to modern energy sources must be appreciated so that energy is given adequate attention when rural development strategies are being designed.

6. During the second informal session, experts presented their experiences of implementing RET options for rural development. This discussion included some of the key

challenges they had faced and the steps they had taken to overcome them. Some of the main barriers to scaling up access to modern energy services in rural areas were: (a) poor policy and institutional contexts; (b) limited human capacity; (c) low levels of investment in rural areas; (d) the limited purchasing power of energy users to pay for fees; (e) technical complexities; and (f) social and cultural issues, including unreceptive attitudes resulting largely from a lack of knowledge about new solutions.

7. Rural energy planning and implementation could not be isolated from other rural development activities. Rural energy was a means and a driver of sustainable rural development. If renewable energy technology programmes were to catalyse rural development, they needed to become an integral part of rural development efforts, in collaboration with different stakeholders. Several experts stressed that rural energy services should support productive income-generating activities as much as possible. Some of the initiatives that were presented to the expert meeting demonstrated the opportunities that RET programmes offered to trigger associated services as well as local jobs and incomes. In particular, it was noted by experts that integration into rural development strategies would ensure that RET programmes would be appropriate to the specific local setting and would be more likely to be sustainable, especially since there was no "one size fits all" solution. Moreover, in order to break the vicious circle of energy poverty and to overcome the inadequacy of centralized rural electrification in many parts of the world, a new energy paradigm was called for, in which there was a holistic approach to energy, water and land use, and decentralized approaches were on a level playing field with centralized approaches.

8. Several experts noted the importance of promoting a portfolio of sustainable technologies, including efficient stoves and ovens; the improved use of charcoal; promoting the use of solar dryers, solar lighting and wind power; the development of biogas; and enhanced access to mini-electricity grids. Different technologies offered different opportunities for different regions. Identifying the appropriate technology mix for each context remained a key challenge. For instance, low-cost technologies offering immediate benefits – such as cooking stoves – had high acceptability levels among rural populations. It was also observed that local manufacturing had tended to bring down the costs of these technologies.

9. Several participants noted that the experience with the development of biofuels in Brazil had illustrated that strong political commitment and a coherent strategy – matched with the necessary provision of funds over a sustained period of time – could bring strong results. Participants also observed that the promotion of biofuels and other RETs must take into account the balance between economic and environmental sustainability, and also, more importantly, food security. Integrated food–energy systems had been proposed by the Food and Agricultural Organization of the United Nations (FAO) as means of mitigating the risks to food security from biofuel generation. These systems were designed to integrate, intensify and increase the simultaneous production of food and energy by means of sustainable agriculture – either by combining the production of food and fuel feedstock on the same land (e.g. intercropping, agroforestry or agropastoral systems), or by using the by-products of one production system as a basis for the other, i.e. closed-loop systems aiming to maximize the synergies between food crops, livestock, fish production and sources of renewable energy. It was stated that closed-loop systems could be achieved by the adoption of agroprocessing technologies that allowed maximum utilization of by-products, diversification of raw materials and reduced waste production. These systems could also encourage recycling and economic utilization of residues. They could be fairly simple, such as producing biogas for direct on-farm use, or rather sophisticated, with recycling of crop and livestock residues as energy feedstock, animal food and crop fertilizer.

10. Many participants noted the importance of local community involvement in the decision-making processes regarding their village energy project. Experts underlined the need for training and retention of skilled human resources. For instance, the Barefoot College in India had demonstrated that rural women – even illiterate grandmothers – could become reliable solar technicians and/or engineers. The Barefoot College had trained over 100 rural grandmothers from 21 African countries to solar-electrify their villages, with support from the Government of India. Experts also called for efforts to "demystify" RETs, through awareness-raising activities. The experience of the Tanzania Traditional Energy Development Organization had shown that raising awareness about RET options within local communities and information on the availability of extension services were essential. Participants noted that programme development should actively engage the local community at all stages to ensure that local cultural and social practices were taken into account and that the local community assumed ownership of the RET installation, of maintenance, and of revenue collection. Having this community responsibility could go a long way towards ensuring that the RET system was used and maintained in a sustainable way.

11. In order to have the capacity to adapt, install, maintain, repair and improve RETs in local areas, investment in technology transfer must be complemented by investment in extension services. Substantial capacity-building and training must take place, and finance for RET deployment must include this capacity-building as a key component. Furthermore, it was essential that this capacity be retained locally; a number of speakers identified the problem of brain drain from rural areas as being a serious concern in their countries. Several experts stressed the importance of training rural women, as they were much more likely to stay in their villages. The experience of DESI Power in India suggested that local clusters – which provided expertise, advice and training regarding installation, technology adaptation, repair and maintenance – could play a key role in ensuring the long-term sustainability of those projects. A number of experts also highlighted the need to link up those extension services to universities or technical colleges, in order to draw on the expertise and knowledge available in those institutions. Participants underscored the importance of investment in – and support for – those extension services. Workers' and employers' organizations could play an important role in that regard. Their involvement might increase the acceptability of RETs, and facilitate and ensure the long-term sustainability of skills development and training as capacity was built up locally.

12. Experts concluded that energy provision should be linked to the development of agriculture and of other productive and income-generating sectors. Energizing rural development in a sustainable way and building local capacity was a long-term commitment that required strong political will at all levels, as a key strategy for poverty reduction and rural development.

13. The third informal session discussed the potential financing options available at local, national and international levels to enable RET deployment. Experts agreed that, in general, decentralized renewable energy systems were the most cost-effective way of bringing modern energy services – including electricity – to rural areas in many developing countries. The cost of such systems was lower than that of extending the traditional grid, especially when the high losses during transmission and distribution in developing countries were taken into account. The cost of such systems may eventually be lower than what many rural households currently incur by buying candles, kerosene and diesel plus the opportunity costs of time spent (up to three hours a day) collecting firewood. The cost advantages were clear, despite distortions in the energy sector.

14. Despite cost advantages, the economic sustainability of many rural energy programmes remained an issue, and there were financial challenges to setting up such programmes in rural areas. The expert meeting noted that in general, energy was expensive

for the poor in developing countries, who often spent up to a third of their income on it, in various forms. In rural areas, poverty levels were high, and income was often seasonal. The rural poor were not a well-organized political lobby and therefore tended to benefit less from government programmes. Many RETs involved relatively high initial costs for purchasing the hardware. There were also costs involved with building the RET software – i.e. the knowledge and expertise needed (a) to work with systems that are relatively new and unfamiliar in rural areas and (b) to service and maintain the equipment. These costs are higher in the beginning, as local capacities need to be built and spare parts and expertise must often be ordered from far away, even imported from abroad. As systems become more widespread and technologies continue to develop, the average costs decline. Initial projects generate positive externalities for later projects. Financing is needed for project developers and entrepreneurs, as well as for end-users. Financing is also needed for research and development to further improve and adapt the RETs, and also to support the development of associated microenterprises, which are now possible because of the new access to energy.

15. Experts emphasized the importance of levelling the playing field between conventional and renewable energy. Some experts were of the view that there was market failure in the energy sector, and that externalities therefore needed to be internalized. One expert estimated that if all environmental and social costs were internalized, the price of oil might be as high as $500–$800 per barrel. Fossil fuels were often subsidized, thus deepening the wedge between true and apparent costs. Several experts proposed that fossil fuel subsidies should be removed and levies should be collected that could be used to support the development of renewable energy, which has more positive environmental and social effects.

16. Experts discussed numerous financing options, including attracting private sector investors, bank loans, microfinance, donations, the Clean Development Mechanism, public–private partnerships, local–central partnerships, and various forms of government support including setting reliable institutional and regulatory frameworks and providing incentives through tax breaks, subsidies, grants, and the removal of trade barriers. The meeting noted that there were different options appropriate for different situations; for example, standalone home systems versus village-level mini-grids.

17. Governments had an important role in attracting private sector investment in RETs. Some experts observed the crucial need to level the playing field for different technologies. The creation of a legal and economic framework that was stable, transparent and reliable was of critical importance. Plans needed to be made very clear – for example, an investor needs to be sure that if it invests in a mini-grid in a rural area, the Government will not extend the national grid there a few years later. Trade barriers such as overly burdensome tariffs on RET imports, monopolistic rights, unfair or changing tax rules and customs duties, and burdensome administrative procedures should be removed. Ensuring material and intellectual property rights may be important. The meeting noted that a close dialogue between policymakers, the private sector and representatives of rural communities was indispensable, and that market facilitation organizations could play an important role here.

18. Governments could also provide financial incentives. Subsidies could kick-start the process, but they should target expansion of access, rather than consumption, and they should be phased out as energy access facilitates income-generation, which eventually gives people the means to pay the full cost of the energy they consume. The expert meeting heard that in developed countries such as Germany, feed-in tariffs had spurred rapid growth in home solar systems. Such tariffs could be adapted to off-grid or mini-grid systems. For example, with a Regulated Purchase Tariff, the upfront costs of the system were spread and fully recovered over a fixed period. Consumers paid a fixed tariff topped up by ongoing government or donor subsidies, and a long-term contract obliged the company to maintain

the system. One-time connection-based subsidies could spur investment too, but at the risk of system overreach and insufficient resources for operation and maintenance.

19. Governments could also provide tax breaks and exemptions for entrepreneurs investing in RETs in rural areas. Some provided grants, subsidies or matching funds for RET hardware and software. Central and local governments could enter into partnerships: together with private sector associations, with villages, and with cooperatives. Microfinance could be a good tool for small-scale projects such as home solar lighting systems. The availability of microfinance institutions varied greatly, and they seemed to be more effective in rural areas with a higher population density.

20. Banks were often unfamiliar with RETs, did not know how to assess risk, and were therefore unwilling to lend to RET projects, which they often saw as using immature and risky technologies. However, many RETs had been in successful operation for decades. Similarly, poor communities were often viewed as risky, even though evidence suggests that the opposite is the case. It was noted that loan defaults by poor people were usually low. The gap in information regarding the risk levels associated with investing in RETs and poor communities was something that governments could help fill. They could also offer guarantees to banks willing to lend to income-generating RET projects, including to the development of associated microenterprises.

21. To date, the Clean Development Mechanism (CDM) had not been an effective tool for decentralized RET deployment in rural areas in most countries. The process was slow and costly. Since the costs of getting registered and validated were high, small RET projects needed to be bundled and well managed to have a chance of tapping into CDM funds. The costs could be reduced further by building up local capacity to undertake some of the CDM-related activities within the country. A few projects in China and India had been successful, but none had been in sub-Saharan Africa, and only a few in Central America.

22. Donations by non-governmental organizations (NGOs) and by international and regional development cooperation partners had played an important role in many local RET projects. These could be very important in meeting the initial hardware and software costs. However, it was noted that they may not be a sustainable and reliable source of long-term funding and often did not secure operation and maintenance of the system.

23. The commitment to appropriate financial mechanisms and of adequate financial resources must be matched by political commitment and energy strategy development. The fourth informal session discussed the policy issues related to RET deployment – in particular, making policy work for rural populations. Setting a long-term energy strategy was noted as an important policy issue. Some key principles should guide the development of long-term strategies:

(a) Firstly, the enabling environment should be closely aligned with the overall development strategy. In terms of expanding access to energy in rural areas, participation by multiple ministries in the development of rural RET strategies and programmes must be ensured. This would include, inter alia, ministries of agriculture, science and technology, the environment, labour, trade, and planning. This coordination was crucial, in order to get away from the still-persisting view that environmental protection and poverty were separate technical fields. Only an integrated approach that tackled both environmental degradation and economic poverty would lead to rural development. It was noted that such policy coordination and coherence would help to ensure that the development of biomass energy did not hinder the use of crops and lands for food. Full utilization of agricultural and rural wastes should be promoted.

(b) Secondly, a comprehensive legal and regulatory framework making clear provisions for the development of rural energy by building public confidence and

promoting reliable services, through the development of appropriate standards, remained a key building block in the promotion of an enabling environment. For instance, the Government of China had developed over 100 sets of standards. It was noted that standards and regulations along the supply chain were important because they gave a clear signal to investors. They also ensured that the appropriate levels of quality would be met, which was important for consumer confidence and export potential.

(c) Thirdly, energy strategies must take into account the local context. The level of development, types of economic activity, cultural issues, market facilities, the climate, and the availability of renewable resources determined the type of policies and programmes to be developed. In Mauritius, a clear differentiation had been made between the energy needs and production potential on three islands, based on their local populations and resources. Moreover, a shift in the focus from short-term projects to long-term programmatic support was required, in order to address current inconsistencies between technology extension and new technology development, and imbalances in the development of different rural areas. When developing an energy strategy, it was important to realize that there was no "one size fits all" solution, even within individual countries. Different rural areas had different needs, therefore the needs of each particular area must be taken into account. Local government authorities may have a role to play here.

(d) Fourthly, it was important to develop generic local capabilities to innovate – in order to develop policies and regulations, to adapt and modify the RET hardware, to provide the various extension services required to sustain the RET market, and to learn from experience and transfer that accrued knowledge. Governments should take measures to promote the development of local innovative capabilities through adequate public funding of training facilities, and by means of regulations which, inter alia, would require project developers and investors to undertake significant capacity-building activities in tandem with their projects or programmes. Through such mechanisms, demand for RETs could be maintained once initial support (such as subsidies) was no longer available.

(e) Finally, multi-stakeholder input into policy formulation would ensure that policy was relevant to local needs and priorities. Experts noted repeatedly that technology choices involved economic, technical and cultural considerations. One expert presented the Sustainable Livelihoods Approach, which had been developed by Imperial College, London. According to this approach, communities have five sets of assets (financial, human, social, natural, and physical capital). The Sustainable Renewable Energy (SURE) decision support system could help to assess the adequacy of different energy technologies for a specific community by assessing the potential impact of those technologies on the five sets of assets. The system had been piloted in China, Colombia and Cuba.

24. As mentioned by the expert from the African Development Bank, regional cooperation was essential to widen the size of the market in Africa. Active regional integration could allow economies of scale, which were fundamental to stimulating investments in infrastructures producing renewable energy technologies. Sometimes, the narrow national markets discouraged investors. In addition, regional integration could lead to practical cooperation between universities, research centres and government, in terms of research and development for the deployment of technologies, and also for the establishment of norms and standards.

25. International cooperation featured in several of the policy approaches presented. As was noted by experts, international cooperation was extremely relevant, not only in order to access financial resources, but also as a great opportunity for learning from others. Learning from the experiences of other countries would require a strengthening of international knowledge-exchange. A number of participants observed that expert meetings, such as the present meeting, provided a useful platform for sharing experiences and good practice. In some cases, learning from failures could provide useful insights. In Mauritius, for instance,

drawing on lessons learned from previous programmes, a new wind energy technology had been developed to be cyclone-resistant, and measures had been put in place to ensure that there were sufficient means to service the capacity installed.

26. One expert underscored the importance of traditional knowledge in building resilience in food supply, environmental management and energy use. Modern energy technologies should be combined with the traditional knowledge that was present in many local communities around the world.

27. Several international organizations – namely the United Nations Environment Programme (UNEP), the International Labour Organization (ILO) and UNCTAD – presented the relevant findings of recent major studies on UNEP's Green Economy Initiative, ILO's Green Jobs Programme and UNCTAD's *Trade and Environment Review 2009/2010*. According to these reports, the current economic and financial crisis and the interrelated climate and food crises provided opportunities to re-examine sustainable development models and to embark on cleaner, sustainable and socially more equitable pathways of development. The integrated use of RETs in sustainable rural development could provide many development, income-generation and job opportunities.

28. Another issue raised by experts was the need to develop appropriate labour policies to tackle some of the issues presented, for example the lack of trained technicians, and urban drift. The importance of developing labour-intensive energy strategies that created local jobs was highlighted too.

B. The way forward

29. In six breakout groups, experts identified key areas for action at the local, national and regional/international level, as well as possible roles for UNCTAD. It was noted by experts that actions needed to be taken at all levels, and that a coordinated approach was necessary. The following is a synthesis of that discussion:

At the local level

30. There is a need for a decentralized, grassroots approach, and to tap into traditional knowledge. In many cases, opportunities and technologies exist locally, and they should be built upon. Where they are built upon, communities must be given the tools and advice they need. In particular, expectations should be carefully managed.

31. There is a need to empower local people by building capacity and raising awareness. These processes can be instrumental in demystifying RETs. Advocacy for local people is important too, and local government, workers' organizations and NGOs can play a role in this.

32. There is a need to strengthen and expand RET extension services. This includes building local capacity and knowledge, for example through training activities.

33. Assistance needs to be given to local communities to allow them to share best practices within and across countries. These localized best practices should also feed into national-level decision-making.

At the national level

34. There is a need for existing national development strategies to include an RET component. This requires clear targets and monitoring mechanisms, based on a needs/resources assessment. Multi-stakeholder dialogue in this process will ensure that the RET component is designed to meet development goals, and it will also ensure an integrated approach.

35. A long-term straightforward energy services policy can ensure that appropriate policy instruments – for example taxes, subsidies, trade policies, labour policies and environmental policies – are geared towards energy systems that drive productive activities. Rural energy agencies can play a part in promoting this. Governments should also consider supporting microcredit institutions.

36. Governments need to provide an enabling environment that encourages private and cooperative sector initiatives in RETs. This must include standards and regulations.

37. Governments need to include RETs in their national budget allocations; they may wish to use public finance to leverage private finance.

38. Capacity-building within government institutions and workers' and employers' organizations is important so that the value of RET options is understood by all sectors. In addition, resources need to be made available to all ministries. Efforts are also needed at the national level, so that new extension services can be developed and existing extension services can be strengthened and expanded. In particular, the development of local innovative capabilities – which would allow for RETs to be adapted to suit local conditions – should be promoted.

At the regional and international level

39. A sense of urgency regarding the further development and deployment of RETs is missing in the international community. Expanding modern energy services – particularly for rural development – is of critical importance.

40. A shift is seriously needed, away from an emphasis on growth, and towards a holistic, complex systems approach, in order to tackle this issue properly.

41. Long-term commitment is needed, through programmatic, country-owned interventions. In particular, funding for software and capacity-building is required. (This does not primarily mean providing human resources, but rather developing them.)

42. Assistance needs to be given to governments to help them to review existing policy initiatives, identify gaps, and plan strategies to modify policies as necessary.

43. Assistance in technology transfer is needed. South–South and South–North cooperation partnerships for technology transfer – including the setting-up of local manufacturing and service operations and capacity-building and training – should be promoted much more actively, and mechanisms should be established for financial support to start such activities.

44. CDM procedures should be streamlined, so as to make them more accessible for small-scale RET projects.

45. United Nations bodies may wish to create a website where all work on renewable energy would be displayed and best practices presented.

At the UNCTAD level

46. There is a clear role for UNCTAD in carrying out independent research on integrated approaches to RETs as a tool for pro-poor development. Based upon this, UNCTAD should facilitate exchanges of experiences and best practices between countries and communities.

47. UNCTAD should promote South–South cooperation in the area of RETs for rural development, including trade and technology-transfer aspects.

48. UNCTAD could play a coordinating role in disseminating knowledge about different experiences of and approaches to the transfer of RETs, and about the development of associated local innovation capabilities.

49. UNCTAD should facilitate multi-stakeholder dialogue on RETs for rural development at national and international levels. This should include measures to link grassroots communities with these discussions and conferences.

50. UNCTAD should continue to expand its cooperation with other relevant international and regional organizations and United Nations bodies, such as the International Renewable Energy Agency (IRENA), the Union Economique et Monétaire Ouest Africaine (UEMOA), regional economic communities, FAO, the United Nations Industrial Development Organization (UNIDO) and UNEP. This cooperation includes areas of common interest, such as the interface between RETs, food security and sustainable agriculture.

II. Organizational matters

A. Election of officers

51. At its opening plenary meeting, the expert meeting elected the following officers:

Chair:	Mr. Khondker M. Talha (Bangladesh)
Vice-Chair-cum-Rapporteur:	Mr. Wolfgang Rechenhofer (Germany)

B. Adoption of the agenda and organization of work

52. At its opening plenary, the expert meeting adopted the provisional agenda for the session (contained in document TD/B/C.I/EM.3/1). The agenda was thus as follows:

1. Election of officers
2. Adoption of the agenda and organization of work
3. Green and renewable technologies as energy solutions for rural development
4. Adoption of the report of the meeting

C. Outcome of the session

53. At its opening plenary on Tuesday, 9 February 2010, the expert meeting agreed that the Chair should summarize the discussions.

D. Adoption of the report

54. Also at its opening plenary, the expert meeting authorized the Vice-Chair-cum-Rapporteur, under the authority of the Chair, to finalize the report after the conclusion of the meeting.

Annex

Attendance*

1. Representatives of the following States members of UNCTAD attended the expert meeting:

Albania
Algeria
Angola
Argentina
Bangladesh
Belarus
Belgium
Benin
Botswana
Brazil
Cameroon
Cape Verde
China
Congo
Côte d'Ivoire
Cyprus
Democratic Republic of the Congo
Dominican Republic
Eritrea
France
Germany
Guatemala
India
Italy
Jordan
Kazakhstan
Kenya
Kyrgyzstan
Libyan Arab Jamahiriya
Malaysia
Mali
Mauritius
Mexico
Morocco
Myanmar
Netherlands
Nigeria
Oman
Poland
Russian Federation
Rwanda
Saudi Arabia
South Africa
Spain
Thailand
Togo
Turkey
United Arab Emirates
United Republic of Tanzania
United States of America
Venezuela (Bolivarian Republic of)
Zambia
Zimbabwe

2. The following intergovernmental organizations were represented at the session:

African Development Bank
African Union
Common Fund for Commodities
European Union
South Centre
Union Economique et Monétaire Ouest Africaine

3. The following United Nations organizations were represented at the session:

Economic and Social Commission for Western Asia
Economic Commission for Europe
United Nations Environment Programme
International Trade Centre UNCTAD/WTO

* For the list of participants, see TD/B/C.I/EM.3/Inf.1.

4. The following specialized agencies and related organizations were represented at the session:

Food and Agriculture Organization of the United Nations
International Labour Organization
United Nations Industrial Development Organization
World Health Organization
World Intellectual Property Organization
World Trade Organization

5. The following non-governmental organizations were represented at the session:

General category

Ingénieurs du monde
Centre for International Environmental Law
International Centre for Trade and Sustainable Development
Mandat International
OPEC Fund for International Development

6. The following panellists were invited to the expert meeting:

Mr. Jim **Watson**, Director, Sussex Energy Group, SPRU (Science and Technology Policy Research), University of Sussex, United Kingdom
Mr. Semereab **Habtetsion**, Director, Energy Resources Development Division, Ministry of Energy and Mines, Eritrea
Mr. Estomih **Sawe**, Director, Tanzania Traditional Energy Development Organization
Mr. Bunker **Roy**, Director, Barefoot College, India
Mr. Hari **Sharan**, DESI Power
Mr. Simon **Rolland**, Alliance for Rural Electrification
Mr. Nicolas **Huber**, DWS Investments
Ms. Langiwe **Chandi**, Acting Principal Energy Officer, Renewable Energy and Energy Management, Department of Energy, Ministry of Energy and Water Development, Zambia
Mr. **Hao** Xianrong, Director, Division of Energy and Ecosystem, Department of Science, Technology and Education, Ministry of Agriculture
Mr. Pradeep **Soonarane**, Deputy-Director, Technical Services Department, Ministry of Renewable Energy and Public Utilities, Mauritius
Mr. Iván **Azurdia**, Senior Advisor, Asociación para el Desarrollo Rijatzul Q'ij, Guatemala
Mr. Nogoye **Thiam**, African Development Bank
Ms. Fatma **Ben Fadhl**, UNEP Green Economy, Geneva

7. The following representatives of academia and the private sector were invited to the expert meeting:

Ms. Katie **Bliss**, Solar Aid
Mr. Judith **Cherni**, Imperial College
Ms. Aurelia Rochelle **Figueroa**, Energy Policy Fellow, Robert Bosch Foundation
Mr. David **Souter**, ICT Development Associates
Mr. Keith **Tyrell**, Koru Foundation
Mr. Filippo **Veglio**, World Business Council for Sustainable Development
Mr. Jim **Watson**, SPRU