

Renewable Energy Toolkit Needs Assessment

August 2005

JOINT UNDP / WORLD BANK
ENERGY SECTOR MANAGEMENT ASSISTANCE PROGRAMME (ESMAP)

PURPOSE

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Energy Sector Management Assistance Program
(ESMAP)

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1

Background and Rationale

1.1 Over the next 20 years, more than 450 million people will join the 1.6 billion currently without electricity unless the pace of electrification is substantially accelerated. Expanding access to modern energy, including electricity, has been a World Bank Group (WBG) priority since 1976, and over the past three decades the Bank has supported more than 50 projects totaling US\$4 billion in loans and credits for rural electrification projects. Over the past decade, the Bank has supported more than 25 rural electrification projects with renewable energy (RE) components in Asia, Africa, Latin America and Caribbean (LCR), as well as International Finance Corporation (IFC) global programs, with a total investment cost of more than US\$700 million.

1.2 In 2003 the Bank's Executive Directors and senior management called for an expansion of infrastructure lending, as reflected in the Infrastructure Action Plan now being implemented.¹ Scaling up rural energy access is essential if particularly disadvantaged majorities in developing countries are to benefit from this new emphasis on infrastructure.²

1.3 RE is playing an increasingly important role in improving energy security and increasing access to modern energy services. The WBG has been a leader in RE as well, having supported US\$2.7 billion in RE direct investment via the International Bank for Reconstruction and Development, International Development Association, IFC, and Global Environment Facility (GEF) plus leveraged financing using Multilateral Investment Guarantee Agency guarantees and RE-based carbon emissions reduction purchases through the Carbon Finance Business.

1.4 The International Conference on Renewable Energies in Bonn in June 2004 generated tremendous interest and commitments for scaling up RE from governments in both developed and developing countries, multilateral agencies, civil society, and the private sector. The WBG committed to a target of at least 20 percent

¹ <http://www.worldbank.org/infrastructure>.

² In many countries, minorities are marginalized not only by language or culture but also by lack of access to infrastructure, especially electricity. Off-grid electrification projects, many of them utilizing renewable energy sources such as solar photovoltaic (PV), wind, and small hydro, have proven an effective means of providing access to electricity for these minority groups

average growth annually in both RE and energy efficiency lending over the next five years. To achieve this commitment, the WBG must increase its capacity to assist client countries in developing and implementing RE and energy efficiency projects, as well as more rapidly transfer best practice across sectors and regions.

1.5 There is now a strong foundation of good practice emerging from past and ongoing RE projects, whether supported by the WBG or others, making it possible to develop and implement future projects faster, at lower costs, and with greater confidence in their overall sustainability.³ To further this process, the World Bank plans to develop an “Operational Guide to Design and Implement Renewable Energy,” which will provide the necessary tools to assist Bank staff and member country personnel in improving the design and implementation of RE projects. In a parallel development, the RE industry requested that the Bank take the lead in preparing a “Business Handbook for Renewable Energy,” which may incorporate some or similar practical content as the operational guide.

1.6 A key difference between this operational guide and previously issued reports is that this toolkit will be operationally oriented and provide specific guidance, case studies, lessons learned, and sample documents on various design features of RE projects. It builds on past experience to help develop and implement rapidly scalable models that have the potential to increase RE in client countries by several orders of magnitude. This operational guide will help to significantly reduce project preparation cost and preparation time and increase project success rate.

1.7 Developing the RE toolkit consists of two phases: phase I, a scoping study and need assessments, and phase II, developing the RE toolkit. This report summarizes the findings from phase I. It consists of the following four sections, which are the major activities undertaken under phase I:

1. Need assessment with the World Bank Group task managers
2. Need assessment with RE industries and financial institutions
3. Inventory research of previous work on toolkits related to rural energy and renewable energy
4. Development of a conceptual framework and a proposal for phase II.

³ The value of building on prior experience and knowledge was clearly demonstrated in the Sri Lanka Energy Services Delivery and the follow-on Renewable Energy for Rural Economic Development Projects, where the cost of preparation of the second project was only US\$120,000, an order of magnitude smaller; the preparation time of the second project was under six months, compared to about two years for the first project; and the implementation pace is demonstrably faster.

2

Needs Assessment with World Bank Group Task Managers

Objectives

2.1 One of the key lessons learned from the previously developed toolkits and handbooks is that the audience found them not useful because they were not tailored to and did not fully address the needs of the audience. Therefore, the first task of this project is to assess the needs of Bank task managers on the scope, content, and format of the toolkit to better serve the audience.

Methods

2.2 The project team prepared a short PowerPoint presentation outlining the issues and conducted in-person interviews with regional task managers in the Sub-Saharan Africa, East Asia and the Pacific, Latin America and the Caribbean, and South Asia Regions within the Bank. These interviews focused on three key issues:

1. Who are the audience?
2. What are the critical needs to assist the Bank staff in designing and implementing energy access and renewable energy projects?
3. What most effective delivery mechanisms should be used to meet such needs?

Results

2.3 All interviewed task managers showed great interest in and support for developing an RE toolkit and provided constructive inputs for the scope of the toolkit. The results of the interviews are summarized below.

Audience

2.4 The targeted audience for phase II of this project should primarily be World Bank (Bank) staff, then the project can expand its scope to cover an external audience of RE business and financing communities at a later phase. However, the Bank task managers also have different levels of proficiency in rural electrification and renewable energy projects, including (a) those who are generally familiar with this

subject, (b) those who are proficient in this area, and (c) expert practitioners of RE issues. The design of the toolkit, therefore, should be tailored to address the different needs of task managers at each level, with various detail levels provided in the toolkit. Local stakeholders in the Bank client countries and other donor agencies who design and implement RE projects can also benefit from the toolkit.

Contents

2.5 Most task managers expressed the needs for:

- Rationale of rural access and renewable energy: Supporting materials to convince decision makers such as ministers and country directors of the importance of energy access and renewable energy and inclusion of such materials in the Country Assistance Strategy and Poverty Reduction Strategy Paper (PRSP).
- Options and tools to address key issues encountered in energy access and renewable energy projects: Policy, regulatory, legal, financing, risk mitigation, business models, institutional arrangement, and technology issues related to energy access and renewable energy projects. These options and tools should be based on experience and lessons learned from a list of best practice projects in different countries. The questions that are most asked concern:
 - (a) Rural electrification planning—how to select communities to be electrified, how to determine grid versus off-grid service areas
 - (b) Policy and regulatory framework—policy options to promote renewable energy, regulatory frameworks for rural electrification, how to determine tariffs, etc.
 - (c) Business models for rural electrification and renewable energy—ownership of distribution companies, how to ensure financial sustainability of distribution companies, successful business models for rural electrification and renewable energy
 - (d) Financing mechanisms—how to set up a rural electrification fund (where the funds come from, who administers the fund, how to determine the level of subsidy, whom to subsidize, what to subsidize, how to select service providers to receive the funds), how to provide subsidies for rural electrification and renewable energy (rationalization, fund mobilization, options of subsidy, who, what, how to subsidize), financing mechanisms for renewable energy.
- Case studies: short (two to four pages), real-world case studies to demonstrate what works versus what does not of both successful and failed projects.
- Sample documents: Sample Terms of References (TORs), sample Project Appraisal Documents (PADs), PowerPoint presentations, survey questionnaires, legal and contract documents (power purchase agreement, legal documents for a rural electrification fund), economic and financial analysis, cash flow analysis, technical specifications, and other useful reports.
- A list of resource people: Task managers, peer reviewers, and consultants.

Delivery format

2.6 The project team spent a fair amount of time on what forms of delivery are most helpful to task managers. Although there was no consensus, the following formats are recommended by interviewed task managers:

- Interactive Web-based toolkits
- Conventional printed reports
- A set of PowerPoint slides: Most of the staff expressed the need for a set of PowerPoint slides that summarize the best practice around the world in these issues, so that these messages can be delivered to clients and other decision makers.
- One-on-one mentoring program and expert hotline: Some staff stressed that these formats would be very useful, but they should be flexible and have built-in incentives for the mentors and experts.
- Training seminars and practitioners exchange programs.

3

Survey with Renewable Energy Industry and Financial Institutions

Objectives

3.1 To meet the RE industry's request that the Bank take the lead in preparing the "Business Handbook for Renewable Energy," project team conducted an in-depth survey as part of a needs assessment conducted among the RE business communities and affiliated financial institutions in Africa, Europe, and North America to ascertain priorities and issues that should be addressed and included in such a handbook.⁴

3.2 A project team was fielded consisting of local consultants based in North America, Europe, Kenya, and Tanzania, respectively, each with RE as well as private sector experience. The project team has undertaken an in-depth needs assessment with the RE industry and financial institutions active in both the developing world and selected Organization for Economic Co-operation and Development (OECD) member countries. This report is a compilation and summary of separate papers describing the inputs received from the African, European, and North American RE business communities. To facilitate comparability, the same questionnaire (provided in annex 1) was used in all of the survey efforts.

Survey Organization and Selection of Respondents

3.3 The RE business community is made up of several business groupings roughly organized around their technology and application focus. To be comprehensive and reflective of differing perspectives, it was necessary to disaggregate the RE business community according to these business groups. This was important because the business and policy issues facing an RE business can vary considerably across markets and technologies. The following RE subsectors were selected to organize the survey effort and ensure broad representation across the sector: (a) solar photovoltaic (PV), (b) wind power, (c) biomass, (d) hydro power, (e) solar thermal applications, (f) geothermal, and

⁴. Separate surveys were carried out in Europe, North America and Africa (Kenya and Tanzania). All detailed results are shown in annex 2.

(g) project financing. Suggestions for specific respondents were obtained from WBG staff, the International Energy Agency (IEA) and European Union Directorates-General (DG) XVII, and industry associations, including the Solar Energy Industries Association, the American Wind Energy Association, the US Hydropower Council for International Development, and the International Hydro Industries Association. Both the European and North American industries are quite international, and some of the interviewed staff were located in Asia rather than Europe or North America. Many actors are functioning in more than one RE field simultaneously; they were therefore asked to respond from the point of view of their main field of interest. Most of the interviewees are senior staff in the companies such as Vice President, Managing Director or CEO. The structure of survey respondents is presented in table 3.1. A full list of the respondents, organized by region and including their main field of renewable technology interest, is included in annex 2.

3.4 The survey process was successful in capturing a broad cross-section of the RE business community, with 39 for-profit companies, 9 financial institutions (including commercial banks with active RE and carbon business lines), and an additional 3 industrial associations and nongovernmental organizations (NGOs) represented in the results. The companies are large and small, include both manufacturers and distributors, and reflect commercial experience working in both developed and developing countries, including grid and off-grid RE applications.

Table 3.1: Structure of Survey Respondents

| | <i>Number of respondents in North America and Europe</i> | <i>Number of respondents in Africa (Kenya and Tanzania)</i> | <i>Total</i> |
|---------------------------|--|---|--------------|
| Solar PV | 8 | 4 | 12 |
| Financial institutions | 5 | 4 | 9 |
| Biomass | 3 | 5 | 8 |
| Wind power | 4 | 2 | 6 |
| Hydro power | 5 | 1 | 6 |
| Geothermal | 2 | 2 | 4 |
| Others ^a | 3 | 1 | 4 |
| Solar thermal application | 2 | 0 | 2 |
| Total | 32 | 19 | 51 |

a. Others are private utilities and NGOs.

Survey Method

3.5 Respondents were sent an e-mail requesting their assistance in the survey effort, along with a simple, two-page format listing the questions for which input was sought and an explanatory note. Telephone interviews and in-person interviews were then conducted, with some respondents also filling out and returning the survey formats.

3.6 The survey questionnaire format is provided in annex 2. The surveys focused on four major questions:

1. What are the major barriers to scaling up RE in the developing world?
2. What business models and strategies do you employ or can you suggest that would assist in scaling up RE in developing countries?
3. How can the World Bank assist in scaling up RE ?
4. What issues and content should the Renewable Energy Business Handbook address?

Results

3.7 A summary of the detailed responses for each respondent is provided in annex 3. The next section summarizes the responses to the major questions listed above. Because the European and North American respondents provided similar responses, but the African responses differed somewhat, this section separates the European and North American responses from the African ones.

Major barriers to scaling up RE

European and North American responses

3.8 The most frequently cited barriers fell into four categories: regulatory risks, financing, institutional capacity, and infrastructure. The frequency of cited barriers is shown in table 3.2.

Table 3.2: Frequency of Cited Barriers—European and North American Responses

| | <i>Number of responses</i> | <i>Percentage of responses</i> |
|-----------------------|----------------------------|--------------------------------|
| High regulatory risks | 23 | 72 |
| Lack of financing | 19 | 59 |
| Weak local capacity | 17 | 53 |
| Weak infrastructure | 9 | 28 |

3.9 Lack of favorable regulatory framework and enabling environment: Respondents perceived regulatory risks, notably uncertain or unfavorable regulatory environments and lack of a level playing field between renewable and conventional energy supply. Regulatory risks and availability of financing were closely linked, usually because of a lack of the long-term contractual instruments (power purchase agreements) essential to project financing. Procedures to select partners in large projects were also cited as often unclear, too complex, and too lengthy.

3.10 Lack of financing: Lack of financing is a perennial problem, both in the form of project financing at affordable terms and in the lack of consumer credit institutions in the case of household-level RE systems. Other barriers specific to local financial institutions included projects deemed too small to be bankable and a lack of well-defined standard procedures, such as how to conduct or evaluate feasibility studies.

3.11 Weak capacity of governments and local stakeholders: Respondents frequently cited barriers in the form of weak, unstable, or overly bureaucratic government agencies and onerous or overly bureaucratic licensing, permitting, and project evaluation procedures. Barriers caused by lack of capacity extended to the private sector as well, with respondents citing difficulties in finding local partners or creating local distribution networks.

3.12 Weak infrastructure: Weak or ill-suited infrastructure, both power grids and transport, were mentioned as impediments to project development.

3.13 There was no consensus among the respondents as to whether direct capital subsidies, subsidized loans, or both are a barrier or a benefit. Some claim that RE programs with a subsidy scheme (soft loan or grant), as often financed through multilateral development banks, are a serious barrier to market development, but others claim that subsidies are clearly needed to become competitive with conventional energy.⁵

African (Kenya and Tanzania) responses

3.14 Local business people in Kenya and Tanzania provided a similar list of barriers to RE scale up (see table 3.3).

Table 3.3: Frequency of Cited Barriers—African Responses

| | <i>Number of responses</i> | <i>Percentage of responses</i> |
|---|----------------------------|--------------------------------|
| Lack of financing | 11 | 58 |
| Lack of favorable RE policy | 11 | 58 |
| Weak local capacity | 10 | 53 |
| High first costs | 9 | 47 |
| Low awareness | 9 | 47 |
| Remoteness and social or cultural limitations | 2 | 11 |

3.15 Lack of financing: Interviews with RE entrepreneurs reveal a lack of funding from local banks for small-scale businesses. Most of the local commercial banks provide only short-term funds and therefore are not interested in providing long-term

⁵. At least two respondents noted that big projects financed by soft loans through the World Bank were in fact a barrier to scaling up, because they tended to “freeze” the market while potential buyers waited for softer credit or subsidized prices to take hold.

loans for RE projects. In addition, most lenders are not familiar with the viability of RE technologies. Furthermore, the banks have strict requirements for loan applicants. The Kenya Union of Savings and Credit Cooperatives (KUSCCO), one of the leading credit providers in Kenya, concedes that the procedure followed by lenders is too laborious and time consuming.⁶ Another concern raised was the imposition of import duty and value added tax on most solar equipment and accessories.

3.16 Lack of a favorable RE policy: Government support, crucial to the early development and uptake of RE equipment, is weak. Respondents cited a pattern of bias, with governments tending to support conventional (grid-based) energy supplies at the expense of RE.

3.17 Weak local capacity: Respondents cited a lack of high-level expertise to develop, operate, and maintain the equipment, as well as a lack of technical support on the ground to ensure effective installation of equipment and maintenance. This lack of capacity often results in poor installation outcomes. In addition, private sector participation in the RE sector is insufficient.

3.18 High first costs: Because of high first cost and lack of flexible financing terms, RE systems are not affordable for most applications, especially for poor people

3.19 Low awareness: The public, including end users, has not been informed of the availability, usage, and benefits of RE systems.

3.20 Remoteness and social or cultural limitations: For rural applications, the remoteness of potential clients and poor understanding of local needs were cited as barriers to establishing and growing RE markets.

Business models and strategies that can be used in scaling up RE

European and North American responses

3.21 The most commonly cited business strategies fell into four categories, as presented in table 3.4.

⁶ Business models adopted by microfinance institutions (MFIs) that provide consumer lending target clients with regular income to ensure that they can recover their money through check-off systems. Therefore, one of the reasons advanced by the MFIs interviewed is that energy systems such as solar PV do not generate income for clients and the systems do not pay for themselves. Targeting individuals with regular incomes minimizes risks and ensures repayments. Therefore, there are continuing problems in access to energy equipment by clients who do not have regular income. The interviewee from KUSCCO gave an example of loan processing from the IFC's Photovoltaic Market Transformation Initiative (PVMTI), revealing that it takes too long for loan applications to be reviewed and approved and for disbursements to be made to beneficiary institutions to invest in RE systems. This leads to delay in implementing RE programs funded under this initiative.

Table 3.4: Frequency of Cited Business Strategies—European and North American Responses

| | <i>Number of responses</i> | <i>Percentage of responses</i> |
|-------------------------------------|----------------------------|--------------------------------|
| Government policy engagement | 20 | 63 |
| Public-private partnership strategy | 15 | 47 |
| Grassroots engagement | 11 | 34 |
| Selective targeting of RE markets | 10 | 31 |

3.22 Government policy engagement: In this strategy, the company engages with the government or regulators to help influence the rules and procedures for rural electrification or power sector planning. A favored approach is to seek guaranteed markets for RE, notably through RE portfolio standards requirements for resource additions that include RE set-asides.⁷

3.23 Public-private partnership strategy: In this strategy, the company pursues partnerships with government agencies, usually on a programmatic level (such as rural electrification). The company can identify niche applications where subsidies are available or seek cofinancing or grant assistance to help plug gaps between affordability and project cost.

3.24 Grassroots engagement: In this strategy, the company develops clusters of business activities that are organized from the bottom up, based on and responding to existing and potential local markets, and realized with partners such as locally operated distributor networks, community groups, and small businesses.⁸

3.25 Selective targeting of RE markets: Several respondents acknowledged selective targeting of markets, in which companies preferentially operate in those countries where the local policy and regulatory environment favors the use of RE and where there are clear advocates for RE.

3.26 Most respondents noted that mechanisms for supporting implementation of these business strategies do not exist at present. Some form of financial support, especially for the initial country engagement (which may take some time) is needed. Other forms of support for early market creation and subsequent scaling up are also appropriate, including (cross) subsidies, long-term financing, guarantees, or a combination of these supports. The rules for using these mechanisms should be transparent, clear, and uniformly applied.

African (Kenya and Tanzania) responses

3.27 The business strategies put forward by the African RE business leaders were more focused and targeted specifically toward addressing perceived market barriers.

⁷. This top-down market creation strategy was cited as applicable to both developed and developing economies.

⁸. Although this activity is time consuming, some respondents see this grassroots development process as ultimately more efficient and more sustainable.

More tactical than strategic, the respondents put forward the following six approaches shown in table 3.5.

Table 3.5: Frequency of Cited Business Strategies—African Responses

| | <i>Number of responses</i> | <i>Percentage of responses</i> |
|---|----------------------------|--------------------------------|
| Addressing affordability | 11 | 58 |
| Capacity building for both buyers and sellers of RE | 10 | 53 |
| Reducing perceived risk to lenders and purchasers | 10 | 53 |
| Demonstration and dissemination of RE | 8 | 42 |
| Private-public partnership models | 7 | 37 |
| Inclusion of RE in poverty alleviation and sectoral plans | 2 | 11 |

3.28 Addressing affordability: Several arrangements are under trial, including hiring, leasing, hire-purchase schemes, providing credit and repayment terms in cooperation with MFIs, and design of financing schemes targeting clients without a regular income.

3.29 Capacity building for both buyers and sellers of RE: Respondents identified the need for building technical capacity and understanding. Suggested approaches included providing advisory services to groups buying the equipment for use and establishing RE dealership networks with qualified field personnel.

3.30 Reducing perceived risk to lenders and purchasers: Mentioned activities included seminars for lenders, helping lenders develop risk mitigation instruments, improved after-sales service, and integration of financial and technical training for lenders and RE businesses.

3.31 Demonstration and dissemination of RE: Numerous ideas for increasing consumer awareness and government recognition of RE were being tried, including demonstration sites in rural areas and exhibitions, trade shows, symposiums, company journals, and other newsletters.⁹ One specific initiative is the use of savings and credit cooperative organizations (SACCOs) to promote installation and usage of solar home-lighting systems.¹⁰

3.32 Private-public partnership models: This approach focuses on building partnerships with government (through collaboration on planning and interventions), schools (through curriculum and training), and energy utilities (through technology development) with the aim of establishing a broad-based coalition of RE partners.

⁹. The Kenyan respondents noted the need to overcome some stigma attached to RE because of previous failures of poorly designed projects.

¹⁰. The cooperative movement in Kenya is large, with hundreds of thousands in membership.

3.33 Inclusion of RE in poverty alleviation and sectoral plans: Respondents recommended inclusion of RE in poverty alleviation interventions and strategies and sectoral plans and policies, as well as encouragement of private sector participation.

The World Bank’s role in scaling up RE

European and North American responses

3.34 The European and North American respondents held several distinct views as to the World Bank’s role in scaling up RE use, as shown in table 3.6.

Table 3.6: Frequency of Citations of the World Bank’s Role—European and North American Responses

| | <i>Number of responses</i> | <i>Percentage of responses</i> |
|---|----------------------------|--------------------------------|
| Facilitating the enabling environment | 22 | 69 |
| Working closely with local banks and MFIs | 19 | 59 |
| Mitigating risks for private sector investment | 14 | 44 |
| Piloting innovative mechanisms | 7 | 22 |
| Advocating integrated and cross-sectoral approaches | 4 | 13 |
| Coordinating different players | 3 | 9 |

3.35 Facilitating the enabling environment of policy and regulatory framework for RE investment: Several respondents urged the World Bank to “stop being a bank” for now and focus on creating sector conditions and institutional frameworks necessary for scaled-up investment in RE. According to these respondents, the Bank’s main focus should be to:

- clarify and promote clear rules for the use and application of subsidies
- help develop appropriate regulatory frameworks
- facilitate long-term price stability, especially through introduction of power purchase agreements or other long-term guarantees
- improve institutional arrangements and sector conditions
- support information exchange, training, and capacity building among the private RE industry, government, and policy makers.

3.36 Working closely with local banks and MFIs: Most of the respondents felt that the Bank should continue supporting increased investment in RE through soft loans, grant assistance, or other forms of financial remediation. In doing so, the World Bank should pay particular attention to assisting local banks and MFIs in including RE in their lending portfolios. In fact, one respondent indicated that the Bank’s measure of success would be when the local banks do not need Bank financing anymore.

3.37 Mitigating risks for private sector investment: A particular hurdle to investment is perceived as real project and sector risk. Respondents singled out the role the Bank could play in reducing risk to levels acceptable to other investors by:

- providing financial guarantees
- aggregating smaller projects into large ones that can be more easily appraised and administered
- creating a stable and uniform project development process that is resilient in the face of political or economic instability
- creating a transparent and predictable prefeasibility and feasibility study regime
- increasing certainty and predictability as to carbon credits and levels and carbon finance eligibility and administrative procedures.

3.38 Piloting innovative mechanisms: Some respondents saw the Bank as having a unique capacity to engage in innovation in both technology and institutional and policy frameworks. In this role, the Bank would overcome awareness or first-cost hurdles through direct support of pilot projects and experiment with a large variety of financing and subsidy mechanisms. Successful pilots would pave the way for scalable RE applications.

3.39 Advocating integrated and cross-sectoral approaches: In this role, the Bank would provide leadership in identifying and valuing the key linkages between energy access and development, including linking the credit sector with the energy sector and linking the energy sector with other consuming sectors (such as the health, education, and rural sectors).

3.40 Coordinating different players: Finally, the Bank was seen as an institution that could increase coordination and reduce conflicting policies or objectives among national government agencies and between donors. This role would require the Bank to proactively coordinate and harmonize development objectives, approaches, and strategies.

African (Kenya and Tanzania) responses

3.41 African RE business community respondents provided numerous specific suggestions as to what the World Bank could do to improve access to RE. According to the respondents, the Bank has a key role to play in provision of investment funding, building capacities and creating awareness, facilitating knowledge transfer, and promoting policy dialogues with the governments. The specific recommendations and their frequency are presented in table 3.7.

Table 3.7: Frequency of Citations of the World Bank’s Role—African Responses

| | <i>Number of responses</i> | <i>Percentage of responses</i> |
|---|----------------------------|--------------------------------|
| Providing funding | 14 | 74 |
| Providing technical assistance and building local capacities | 10 | 53 |
| Conducting education and public awareness campaigns | 10 | 53 |
| Facilitating knowledge transfer | 8 | 42 |
| Supporting governments in developing favorable policy and regulatory frameworks | 6 | 32 |
| Supporting local manufacture of RE equipment | 3 | 16 |

3.42 Providing funding: The Bank should directly support scaling up of RE through an array of mechanisms, including concessionary financing to support projects, grant assistance to help address up-front investment cost and limited availability of long-term capital, direct funding of research on RE and training of RE specialists, financial guarantees to enable more affordable credit for RE development, and creation and support of MFIs providing credit to low-income groups.

3.43 Providing technical assistance and building local capacities: The Bank can play a worthwhile technical facilitation role by identifying viable projects (such as solar water pumping), supporting development of appropriate technology commensurate with national energy needs, and promoting technology transfer programs. In addition, the Bank should support local capacity building and training on RE technologies for investors, lenders, service providers, communities, and consumers.

3.44 Conducting education and public awareness campaigns: The Bank could participate in educating the public about correct and effective use of RE, including implementing pilot projects to demonstrate RE systems in schools, hospitals, and markets.

3.45 Facilitating knowledge transfer: The Bank should disseminate successful models, information on RE technological innovation, and information on best practices among countries and regions, as well as develop handbooks and training kits, to RE companies, which will assist them in learning how to develop RE projects and improve the quality of services and products.

3.46 Supporting governments in developing favorable policy and regulatory frameworks: The Bank should assist governments in adopting and implementing legal, policy, and regulatory frameworks and developing strategies and actions to promote RE development.

3.47 Supporting local manufacture of RE equipment: To reduce cost, the Bank should support client countries in promoting local manufacture of RE equipment and developing product standards that support sustainability of RE investments.

Content of the RE Business Handbook

European and North American responses

3.48 Most respondents welcomed the idea of a Handbook, although there were differing views on its content or its usefulness to their company in particular. Large companies often have their own manuals and toolkits, and some of them are even willing to share their materials with the Bank. Generally, local companies, governments, and MFIs were thought to benefit most from a handbook. The suggestions for the handbook content revolved around three central parts—procedures; templates and data, and case studies (see table 3.8).

Table 3.8: Frequency of Cited Content the Handbook—European and North American Responses

| | <i>Number of responses</i> | <i>Percentage of responses</i> |
|--------------------|----------------------------|--------------------------------|
| Templates and data | 24 | 75 |
| Case studies | 19 | 59 |
| Procedures | 13 | 41 |

3.49 **Templates and data:**

- Country-specific market assessments, country-specific reviews of the RE resource base, or the national power development or rural electrification plans are needed.
- Templates would include examples of project proposals, legal documents used in the various countries (for example, renewable energy law and power purchase agreements), guidelines for specific tasks, and minimum qualifications for local partners.
- The subject of long-term data on energy resources (wind, water) was mentioned several times, as well as socioeconomic, legal, and policy data for the various countries.
- Matchmaking—how to find the right partners (both a technical partner and a local financial institution) and ascertain their minimum qualifications, is an important consideration, particularly in the recipient countries, but to a certain extent also in Western countries (technology provider, source of soft finance). This database of potential partners should be updated regularly.
- Tools or other forms of assistance on applying for a financial contribution under a green mechanism (for example, the GEF and Clean Development Mechanism [CDM]) are needed because the current rules are perceived to be

incomprehensible. The handbook could be a vehicle to ensure that all partners speak the same technical, financial, and legal language. However, care would need to be taken in representing and comparing the several distinct RE technologies.¹¹

3.50 Case studies: Several respondents suggested that a compendium or an atlas showing projects and RE companies by country and technology would be useful. Several respondents suggested a primer on technologies and planning and design methods and a guide to institutional arrangements supporting sustainability. Two respondents also specifically suggested inclusion of a longitudinal project evaluation study that would track and report on the actual outcomes of projects 5, 10, or even 20 years after commissioning.

3.51 Procedures: Most respondents expressed interest in an “expandable checklist” for guidance on the RE project development process from conception to realization. This would provide them with both a list of necessary checkpoints for further evaluation and the details they may be currently lacking but need to address in project development.

African (Kenya and Tanzania) responses

3.52 Almost all respondents felt a handbook would be useful. The handbook will help reduce misinformation or incomplete information for end users, installers, policy makers, and lenders. Issues to be addressed by the handbook include technical and quality issues, case studies and business models, alternative energy sources and systems, and available support and resources (see table 3.9).

Table 3.9: Frequency of Cited Content of the Toolkit—African Responses

| | <i>Number of responses</i> | <i>Percentage of responses</i> |
|--|----------------------------|--------------------------------|
| Technical and quality issues | 12 | 63 |
| Case studies and business models | 11 | 58 |
| Alternative energy sources and systems | 8 | 42 |
| Available support and resources | 6 | 32 |

3.53 Technical and quality issues: This section would treat technical and practical aspects of RE systems in more detail, including:

- system sizing and costing for different RE applications
- review of RE system design approaches, especially advantages and disadvantages
- quality guidelines and purchasing advice (what people should be looking for while purchasing RE equipment)

¹¹. The North American RE community is characterized by “stove-piping”, where one RE technology provider perceives itself as in zero-sum competition for resources and markets with other RE technology providers.

- simple guidelines on maintaining RE systems
- Illustrations and simple pictorial guides to RE systems
- World Bank standards and codes of practice on renewable energy equipment
- instructions on how to prevent theft.

3.54 Case studies and business models: This section would provide detailed discussion of successfully implemented RE projects as well as some case studies of failed projects (with descriptions of the reasons for failure). This section could also provide examples of RE business models and options.

3.55 Alternative energy sources and systems: This portion of the handbook would include a general description of the various uses of RE systems, including some discussion of merits and demerits of conventional energy systems. Useful detail on the most common applications and configurations of RE systems would also be included.

3.56 Available support and resources: Most important from the standpoint of RE businesses in developing economies, this section would provide practical information on available training opportunities; a list of institutions financing RE systems and development worldwide; basic standards and major financing facilities; information on the major manufacturers, suppliers, and dealers, including a list of solar companies and NGOs; and World Bank standards and codes of practice on RE equipment and project development

Medium of the handbook and toolkit

3.57 Respondents in all three regions preferred a website, a CD-ROM, or both, although a printed report might be more appropriate for the actors in developing countries. The Web site should be updated regularly and should include downloadable pdf files. Training was also mentioned: this should take place in recipient countries as a way to increase capacity among potential partners and assist in developing good projects.

Case study or example of best practice

3.58 In responding to the question about what case study or example of best practice should be included in the handbook and toolkit, almost every respondent had a suggested case study either of their own doing or one they had admired. These are included in the respondents' summaries provided in annex 3.

4

Inventory Research

Objectives

4.1 The objective of the inventory research is twofold: The first part is to find out what kind of delivery formats are often used for toolkits, and the second is to find out what kind of information is available on rural energy access and RE. To meet this objective, the project team reviewed prior work on (a) toolkits and handbooks that cover a wide range of topics focusing on delivery formats and (b) toolkits and material on rural electrification and renewable energy.

Options for Delivery Formats

4.2 The project team found nearly 150 different toolkits and handbooks on various topics. Of these, about 90 were related to rural energy and renewable energy. These toolkits came in various media, such as books, brochures, policy papers, web sites, portals, CD-ROMs, workshops, seminars, courses, training, retreats, mentoring programs, working lunches, demonstration kits, and so forth. These toolkits provided information that covered a wide range of functions, such as spreadsheet-based computations, data management and analysis, interactive financial models, case studies, step-by-step guides, comprehensive handbooks, decision support tools, road maps, sample documents, survey questionnaires, best international practices, and assessments and diagnostic reviews.

Toolkits on Rural Electrification and Renewable Energy

4.3 Among the 90 toolkits related to rural energy access and renewable energy, about 60 focused on renewable energy, and the rest covered both rural energy access and renewable energy. The developers and sponsors of these toolkits include bilateral donors, multilateral banks and agencies, development organizations, NGOs, research centers, and private entities. Of the 90 toolkits, 14 are World Bank publications (10 are publications of the Energy Sector Management Assistance Program). About 88 percent of the 90 toolkits are more than 2 years old, and some of toolkits are more than 10 years old.

4.4 These toolkits can be roughly classified into the following categories: (a) technical handbooks that focus on RE technologies; (b) theoretical analysis of economic costs, principles, and issues related to rural electrification, RE, and climate change; (c) practical experience of best practice and case studies; (d) step-by-step guidelines for project development and implementation; and (e) training manuals. The toolkits' categorizations on RE and rural energy are shown in tables 4.1 and 4.2, respectively. Lists of reviewed toolkits on rural and renewable energy, with category, are provided in annexes 4 and 5.

4.5 The project team is conducting a more in-depth and wider literature review on RE as part of the phase II efforts. This project will be coordinated with and build on ongoing work documenting lessons learned from RE.

Table 4.1: Toolkits' Categorization: Renewable Energy

| <i>Renewable energy</i> | <i>Technical handbook focusing on technologies</i> | <i>General analysis of economic costs, principles, and issues related to rural development and climate change</i> | <i>Best practices and case studies</i> | <i>Step-by-step project development and implementation</i> | <i>Training manual</i> |
|-------------------------|---|---|---|--|---|
| General RE | <ul style="list-style-type: none"> • Catalogue of small-scale energy equipment • Introduction to small-scale RE technologies • Mini-grid design • Decentralized energy technologies | <ul style="list-style-type: none"> • Climate change: incremental costs, the role of the GEF, lessons from the GEF, and GEF projects' impacts • Cost-effective policy • Cost reduction of grid extension for rural electrification • Rural development: market analysis, impacts, financing, rural enterprise development, and so on • Global renewables market, technologies, and policies • Benefits from investments in RE and future consumer gains • Financing instruments • Tax policy (green fees) • Capacity building | <ul style="list-style-type: none"> • Project opportunities and barriers • Decentralized energy • Household energy use • Policy lessons for the advancement and diffusion of RE • RE on small islands • Integrated resource planning for electricity | <ul style="list-style-type: none"> • Households' and communities' energy needs assessment • Monitoring and evaluation (M&E) of climate change projects • PRSP sourcebook for energy • Financing instruments • Reference guide on climate change | <ul style="list-style-type: none"> • Household energy technology development • Corporate guide to green power markets |
| Wind | Wind pumping | <ul style="list-style-type: none"> • Global wind strategy • Technical status and trends, economics, social considerations, and incentive mechanisms | | <ul style="list-style-type: none"> • Assessment of wind energy's potential • Small wind system for rural energy services • Wind power projects in the CDM | |
| Solar | <ul style="list-style-type: none"> • Solar heating in cold regions • German Agency for Technical Cooperation (Deutsche Gesellschaft für Technische Zusammenarbeit [GTZ]) solar cooker manual • Small solar batteries for lighting services | <ul style="list-style-type: none"> • PV application in rural areas | <ul style="list-style-type: none"> • Best practices for a PV household electrification program • Experience with PV systems in Africa • Lessons learned from World Bank-GEF solar PV projects | | |
| Hydro | <ul style="list-style-type: none"> • Microhydro design manual • Motors as generators for microhydro power | <ul style="list-style-type: none"> • The role of the private sector | <ul style="list-style-type: none"> • Development of microhydro power. | <ul style="list-style-type: none"> • Guidelines for attracting developers • Social evaluation | |
| Biomass | Small-scale biomass gasifiers for heat and power | <ul style="list-style-type: none"> • Modernize biomass (perspectives, technologies, policy recommendations) | | <ul style="list-style-type: none"> • Bioenergy primer | |

Table 4.2: Toolkits' Categorization: Rural Energy

| Rural energy | Technical handbook focusing on technologies | General analysis of economic costs, principles, and issues related to RE | Best practices and case studies | Step-by-step project development and implementation | Training manual |
|--------------|--|---|---|---|---|
| Grid-based | Cost reduction of grid extension for rural electrification | <ul style="list-style-type: none"> • Subsidies and sustainable rural energy services • Tariffs for rural grid electrification • Financial evaluation (<i>Rural Electrification: A Hard Look at Costs and Benefits</i>—see annex 5). • Generators, distribution system, and connection policy • Options for rural electrification | <ul style="list-style-type: none"> • Best Practices for Grid Electrification | <ul style="list-style-type: none"> • Lending for electric power in Sub-Saharan Africa • Energy needs and energy options assessment • M&E in rural electrification projects | |
| Mini-grid | <ul style="list-style-type: none"> • Catalogue of small-scale energy equipment • Mini-grid design • Decentralized energy technologies | | Promoting decentralized electrification investment | Small wind system for rural energy services | Energy technology development for households and microenterprises |
| Stand-alone | <ul style="list-style-type: none"> • Low-cost electrification: affordable electricity installation for low-income households • Small solar batteries for rural lighting services | Renewable energy for rural infrastructure development | Household energy use | Off-grid rural electrification (options, financing, institution, and so on) | |

5

Conceptual Framework for Phase II

Gap Analysis

5.1 Based on the above needs assessment and inventory research of the existing toolkits, a gap analysis was conducted to identify the information gaps between what is needed and what is available.

5.2 The inventory research demonstrated that there is a lot of existing information available. However, as shown in tables 4.1 and 4.2, most of the existing toolkits are technical handbooks and focus on general analysis, with few available for practical project guidance. In addition, most toolkits are more than several years old, and none of them is able to provide a comprehensive operational guide for the Bank’s task managers. The needs assessment, however, demonstrated a strong demand for such an operational guide to assist Bank task managers in designing and implementing energy access and renewable projects.

5.3 Therefore, a comprehensive operational guide to scale up RE is urgently needed for the WBG. This operational guide will fill in the gaps by (a) distilling and synthesizing existing information in an operationally oriented way, (b) incorporating new approaches and models from more recent years, (c) being produced in a user-friendly and easy-to-use format for design and implementation of rural electrification and RE projects, and (d) disseminating it to a wide range of stakeholders.

Project Scope under Phase II

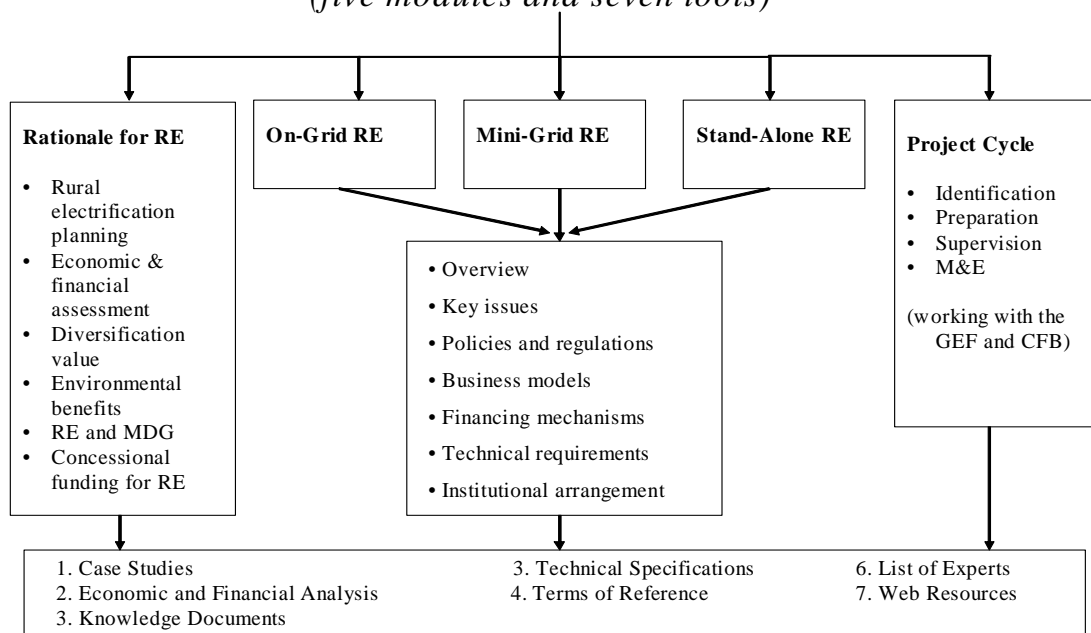
5.4 Scaling up rural electrification and RE are both priorities for the WBG. Although there are overlapping areas between the two—for example, off-grid or mini-grid RE can offer least-cost solutions to energy access, particularly in remote rural areas—the implementation strategies for scaling up rural electrification and RE are different. Given the Bank’s recent priority to scale up RE, as well as the time and resource constraints, phase II of this project will focus only on RE for electricity services, including grid-connected, mini-grid, and stand-alone systems. An operational guide to energy access will be expanded in a later phase.

5.5 As mentioned before, the targeted audience of the phase II project will be primarily the Bank task managers who design and implement RE projects. Local stakeholders in the Bank’s client countries and other donor agencies who design and implement RE projects can also benefit from the toolkit.

Framework for Phase II

5.6 Phase II will provide Bank task managers with an RE toolkit, based on global experience, to better design and implement RE projects. Based on the results of the task managers’ survey, the framework for the toolkit is shown in figure 1. It consists of the following five modules.

Figure 1. Proposed Framework for RE ToolKit
A Renewable Energy Operational Guide for Electric Services
(five modules and seven tools)



(1) Rationale for RE

5.7 This module will address the linkage between RE and the Millennium Development Goals (MDGs) through a brief summary and examples of how RE can contribute to other development sectors, such as agriculture, education, health, cottage industry, telecommunications, and so forth. It will also demonstrate the roles of RE in rural electrification—for example, how to determine grid versus off-grid service areas. This module will also illustrate the economic rationale, environmental benefits, and diversification values of RE. Finally, it will list concessional funding sources for RE from the GEF, Prototype Carbon Fund, multilateral and bilateral donors, and the private sector.

(2) Grid-connected RE (wind, biomass, hydro, and geothermal)

5.8 This module will introduce policy and regulatory options to encourage large-scale RE development such as mandated market policies, financial incentive policies, power purchase agreements, and incorporation of RE into sector reform. It will also discuss financing mechanisms for grid-connected RE to address issues such as whom and how to pay for the incremental costs between renewable energy and conventional energy sources, as well as options for risk mitigation and credit enhancement for private sector investment.

(3) Mini-grid RE (microhydro, biomass, and hybrid)

5.9 This module will first discuss the regulatory framework for mini-grid systems, with a focus on how to set up a cost-recovery tariff structure and provide subsidies. It will then introduce a series of business models to deliver mini-grid system services, including the community cooperative model, utility model, private operator model, and concession model. It will also discuss opportunities for and lessons learned on productive use applications from RE. It will then address financing mechanisms from both the supply and demand sides and how to increase access to financing for both service providers and consumers. Finally, it will describe technical specifications for micro-hydro.

(4) Stand-alone RE systems (solar home systems, picohydro, and microwind)

5.10 This module will first address policy and regulatory options for stand-alone systems, such as rural electrification planning, how to set up subsidies, and so forth. It will then introduce a few business models to deliver stand-alone RE services, including dealer model (cash sale, credit sale, and leasing), fee-for-service, and concession models. This module will also discuss a series of financing mechanisms for stand-alone RE systems from both the supply side, with a focus on financing service providers, and the demand side, with a focus on consumer financing. Finally, it will provide technical descriptions and specifications for solar home systems.

(5) Bank operational cycle

5.11 This module will provide a checklist for task managers to address when they are designing and implementing RE projects along the Bank project cycle: project identification, preparation, supervision, and M&E.

5.12 The content for each module includes (a) a list of key issues for task managers to consider; (b) for each key issue (policy and regulations, business models, financing mechanisms, and technical descriptions), a list of models and options to choose, with advantages and disadvantages of each model, conditions for success, where it worked, and so on; (c) case studies and best practices with lessons learned in design and implementation; (d) sample documents for Bank task managers, including TORs, PADs, power purchase agreements (PPAs), survey questionnaires, economic and financial analysis, technical specifications, PowerPoint presentations, and so on; and (e) a list of resource people, such as consultants, task managers, and reviewers.

Proposed Activities for Phase II

5.13 Phase II will consist of four tasks:

5.14 Task 1 will finalize the conceptual framework and methodology, including (a) the outline of the operational guide, (b) the content for each module, (c) the framework along which each project cycle will proceed, and (d) output formats through reviews and discussions with knowledge management experts in this area.

5.15 Task 2 will collect information for the RE toolkit. This task will first take stock of the Bank's existing renewable energy projects in each region over the past decade through literature review and interviews with task managers and implementing counterparts in client countries. It will collect data and information on existing toolkits, case studies, and best practices outside the Bank. It will also conduct extensive consultations with a wide range of stakeholders, including the client country's government, the private sector, NGOs, MFIs, donors, and others. This process is targeted to identify best practices as well as innovative approaches.

5.16 Based on collection of existing information through these channels, task 2 will then select, synthesize, and analyze the approaches, models, issues, lessons learned, and case studies. The best practice case studies should be based on successful experience inside and outside the Bank that have been implemented for at least 5 to 10 years, so that these examples can clearly demonstrate what works versus what does not. In addition to the successful case studies, the guide should also include some new initiatives that have tested or are currently testing innovative approaches. A set of detailed selection criteria of case studies will be developed. Finally, this task will collect sample documents for Bank task managers, including TORs, PADs, PPAs, survey questionnaires, and so on, and provide a list of resource people, such as consultants, task managers, and reviewers.

5.17 Task 3 will draft and produce the RE toolkit, based on the information collected and involve writing the content for each module, preparing PowerPoint presentations for each module, and writing brief descriptions of each case study. It will also sort sample documents by categories. A Web design company will be selected to convert the RE toolkit to an interactive and user-friendly web-based toolkit. Then, a workshop will be held to get feedback from Bank task managers and their counterparts in the client country, and the revised toolkit will be sent to peer reviewers. Finally, the final product will be placed on the World Bank and ESMAP web site and on a CD-ROM.

Expected Outputs for Phase II

5.18 The specific outputs of phase II will be an interactive web site for the RE toolkit, a report, and a CD-ROM. The outcomes of the project will be that task managers find the toolkit useful when designing and implementing RE projects, less project preparation time and cost will be needed, and more successful design and implementation of RE projects will be implemented. The ultimate outcome of the project will be

increased lending, by several orders of magnitude, by the WBG for RE projects in client countries.

Implementation Arrangement

5.19 The project will be managed by Xiaodong Wang, supervised by Anil Cabraal, and advised by Pablo Rosenthal-Brendel from Energy and Water Department Energy Unit (EWDEN). The team is composed of Pat DeLaquil, Joh Exel, and Yabei Zhang, and 9th insight has been selected to be responsible for the web design of the RE toolkits.

5.20 In addition, the project will draw on Bank operations staff with substantial knowledge of the RE fields—particularly those who have designed, appraised, and supervised previous or ongoing projects—to provide information. Preliminary identification of other staff include ESMAP: Barnes; Latin America and the Caribbean Region: Reiche, Feinstein; Sub-Saharan Africa Region: Cosgrove-Davies, Sanghvi; and East Asia and the Pacific Region: Spencer;

5.21 The project will also involve coordinating with other ongoing efforts and related Bank staff to avoid duplicating efforts, share results, and build on each other's work. Furthermore, the Bank will need to work closely with a broad base of partners, including the bilateral donors, other international financial institutions, investors, and the academic community.

Appendix 1

Survey Questionnaire

Part I: Basic information

- 1.1 Name of respondent _____
- 1.2 Position of Respondent _____
- 1.3 Organization Name _____
- Contact Information _____
- 1.4 Type of Organization (*Check only one box*)
- | | |
|--|--|
| <u>European organizational designations:</u> | <u>N. American organizational designations:</u> |
| <input type="checkbox"/> ₁ Government utility | <input type="checkbox"/> ₁ Industry Association |
| <input type="checkbox"/> ₂ Government research institution | <input type="checkbox"/> ₂ Research institute |
| <input type="checkbox"/> ₃ Other government institution | <input type="checkbox"/> ₃ Government |
| <input type="checkbox"/> ₄ Independent research institution | <input type="checkbox"/> ₄ Financial Institution |
| <input type="checkbox"/> ₅ Private energy company | <input type="checkbox"/> ₅ Manufacturer |
| <input type="checkbox"/> ₆ Other, specify | <input type="checkbox"/> ₆ Project Developer/ESCO |
| | <input type="checkbox"/> ₇ Consultancy |
| | <input type="checkbox"/> ₉ NGO |
- 1.5 Areas of specialisation (Technology) _____
- 1.6 Nature of renewable energy activities undertaken _____
- 1.7 Renewable energy activities institution plans to expand in the future _____

Part II: Needs Assessment

2.1 From your institution's point of view, what are the major barriers to the scale-up of renewable energy use?

1. _____

- 2. _____

- 3. _____

- 4. _____

2.2 What business models and strategies can you propose which would assist in scaling up renewable energy use?

- 1. _____

- 2. _____

- 3. _____

- 4. _____

2.3 What are your views and recommendations on how the World Bank can assist its client countries in improving access to renewable energy?

- 1. _____

- 2. _____

- 3. _____

- 4. _____

- 5. _____

2.4 Would a handbook/toolkit that provides guidelines and case studies illustrating project design and implementation for renewable energy be useful? *(Please tick only one box)*

| | | | |
|---------------------------------------|---------------------------------------|---------------------------------------|---------------------------------------|
| <u>Very Useful</u> | <u>Useful</u> | <u>Not Useful</u> | <u>Not Sure</u> |
| <input type="checkbox"/> ₁ | <input type="checkbox"/> ₂ | <input type="checkbox"/> ₃ | <input type="checkbox"/> ₄ |

2.5 To me most useful from your perspective, what issues should the handbook/toolkit address?

1. _____

2. _____

3. _____

4. _____

5. _____

2.6 What case examples should we include in the handbook/toolkit?

1. _____

2. _____

3. _____

4. _____

2.7 What medium of the handbook/toolkit would be most useful for you?

| | Detailed Report | Training Course | Web-based Package | CD format | Powerpoint Presentation | Others <i>(Please fill below)</i> |
|----|---------------------------------------|---------------------------------------|---------------------------------------|---------------------------------------|---------------------------------------|---------------------------------------|
| 1. | <input type="checkbox"/> ₁ | <input type="checkbox"/> ₂ | <input type="checkbox"/> ₃ | <input type="checkbox"/> ₄ | <input type="checkbox"/> ₅ | <input type="checkbox"/> ₆ |
| 2. | _____ | | | | | |
| | _____ | | | | | |

Appendix 2

Renewable Energy Business Survey Respondents

Europe and North America

| Subsector | Region | Company Name | Contact Person | Title | Website |
|---------------|------------|-------------------------|-----------------------|---------------------------------|--|
| Solar PV | N. America | PowerLight Corp | Greg Rosen | VP - Mktg | www.powerlight.com |
| | | Sharp Solar | Chris O'Brien | VP - Mktg | solar.sharpsusa.com |
| | | SELCO | Neville Williams | Founder | www.selco-intl.com |
| | | Spire Corp | Roger Little | Founder | www.spirecorp.com |
| | Europe | Unisolar | Dick Blieden | VP Technology | www.uni-solar.com |
| | | BP Solar | Arun Vora | MD Tata BP Solar | www.tata.com/tata_bp_solar |
| | | Free Energy Europe | Frank Van der Vleuten | GM | www.free-energy.net |
| Wind | N. America | Shell Solar | Marinus Boogert | Off-Grid Global Sales | www.shell.com |
| | | Bergey Wind Power | Mike Bergey | Owner | www.bergey.com |
| | | GE Wind Energy | Jim Lyons | VP Technology | www.gewindenergy.com |
| | | Northern Power Systems | Jito Coleman | CEO | www.northernpower.com |
| Biomass | N. America | ENEL-International | Roberto Vigotti | VP-International | www.enel.it |
| | Europe | Community Power Corp | Rob Walt | Founder | www.qocpc.com |
| | | Bioener APS | Hans Jorn Clausen | Sales Manager | www.bioener.dk |
| Hydro | N. America | Eta Renewable Energies | Silvia Vivarelli | Biomass Expert | www.etaflorence.it |
| | | DLI Industries | Balrhaj Barma | VP Marketing | www.dlzcpc.com |
| | Europe | Hydro West | Paul Berkshire | President | www.hydrowest.com |
| | | Gugler GMBH | Gerhard Gugler | Managing Director | www.gugler.com |
| | | Hydro Tasmania | Andrew Scanlon | Chair, Sustainable Hydro Assoc. | |
| Solar Thermal | N America | Int'l Hydropower Assoc. | Richard Taylor | Executive Director | www.hydropower.org |
| | | Solargenix | Gilbert Cohen | VP Marketing | www.solargenix.com |
| Geothermal | N. America | Solel | David Sole | VP Marketing | www.solel.com |
| | Europe | Ormat | David Citrin | VP Marketing | www.ormat.com |
| Financial | N America | ABB Ltd | Christian Komevall | Director. Sustainable Energy | www.abb.com |
| | | Free-Stream Capital | Michael Davis | Founder | www.freestreamcapital.com |
| | Europe | Fortisbank | Nick Gartner | Energy Finance Group Director | www.fortisbank.com |
| | | Hypovereinsbank | Reiks Atvar | VP-Power & Environment | www.hpv.de |
| | | Rabo Bank N.V. | Caroline van Tilborg | Head, Carbon Procurement Dept. | www.rabo.nl |
| Others | Europe | Triodos Bank N.V. | Rene Magamans | Sr. Investment Officer | www.triodos.nl |
| | | EREC | Oliver Schaefer | Policy Advisor | www.erec-renewables.org |
| | | EdF | Guy Barboeuf | Rural Electrification Expert | www.edf.fr |
| | | Nuon | Ingrid Plag | Sustainability Advisor | www.nuon.nl |

Africa (Kenya and Tanzania)

| Subsector | Company Name | Location | Contact Person | Title | Website/E-mail |
|------------------------|-------------------------|-----------------|-----------------------|-----------------|--|
| Solar PV | Davis & Shirtliff, Ltd. | Kenya | John Rostorm | Solar Engineer | |
| | Solagen Ltd. | Kenya | Erick Muhanji | MD | www.solagen.com |
| | Rex Investments | Tanzania | Francis Kabbisa | MD | solarenergy@cats-net.com |
| | Solar Electric 2000 | Tanzania | Howard Eaton | MD | solarelectric2000@yahoo.com |
| Wind | Kenital Ltd | Kenya | David Mburu | Asst. Mgr. | www.kenital.com |
| | Craftskills | Kenya | Simon Mwacharo Guyo | Director | www.craftskills.com |
| Hydro | Philafe Engineering | Kenya | Charles Nyagilo | Engineer | |
| Cogen/Gensets | Rift Valley Machinery | Kenya | Marjuice Mulinge | Engineer | rivamas@alphanet.co.ke |
| | Imico Company | Kenya | Jinal B. Singh | Mktg Mgr | |
| | Electrocom Systems | Kenya | Noah Odhiambo | Tech Mgr | |
| | Tanganyika Wattle Co | Tanzania | Omari Athmani | Engineer | |
| Financial Institutions | Mtibwa Sugar Co | Tanzania | Bernard Kihulla | Manager | bkihula@mtibwa-sugar.co.tz |
| | K-Rep Bank Ltd | Kenya | Fidelis Kiomonya | Ops Mgr | |
| | Kenya Union of Savings | Kenya | Edward Mudibo | MD | kuscco@net2000.ke.com |
| | Savings & Credit Coop | Tanzania | Peter Temu Mashigia | Manager | sccult@covision2000.com |
| Geothermal | CRDB Bank Ltd | Tanzania | Anderson Mlabwa | Credit Dir | www.crdb.com |
| | Olkaria Geothermal | Kenya | Dr. Silas Simiyu | Development Mgr | comms@kengen.co.ke |
| Other | First Energy Company | Tanzania | George Kibakaya | Director | kibakaya@yahoo.com |
| | TaTEDO | Tanzania | Estomih Ngaya Sawe | Director | www.tatedo.org |

Appendix 3

Detailed Responses by Region and Industry

European Solar PV Industry

Respondent Name, Title & Company: Arun Vora, Managing Director Tata BP Solar and Vice President of BP Solar; BP Solar

Type of company: Private energy company

Business and Technology Speciality: Project developer; sale and manufacture of PV and solar thermal modules

Indicative Project: PV market development and projects throughout the world

| Major Barriers to Scaling-Up of RE in developing economies? | Successful Business Models/Strategies | What should be the WB Role in assisting RE scale-up | Suggested Content for the Handbook |
|--|---|--|---|
| 1. Capital costs are high; end-user costs should be reduced; absence of appropriate capital subsidy mechanisms that are time-bound (5 yr max) and with reducing levels over time | 1. include PV in loan portfolio of banks | 1. Insist that governments mandate of each 1 MW new capacity 5% is renewable | 1. For BP not too useful; has own handbooks, toolkits, procedures; maybe for local commercial banks would be useful |
| 2. No short-term financing mechanisms available to end-users | 2. assure level playing field renewables – conventional energy | 2. funding for grid-connected systems, rooftop programs, and integrated PV in commercial buildings | 2. Financial engineering examples, models could be useful |
| 3. Regular commercial banks (decentralized) do not include PV in their portfolio | 3. cross subsidies (from conventional to renewable, to create a Renewable Energy fund for financing subsidy mechanism and develop | 3. stop current line of project financing for renewables; there are many other possible mechanisms that cannot be used today | 3. Reliable data on costs in conventional energy area would also be useful |

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| | loan fund | | |
| 4. Technical infrastructure lacks until a larger market develops; the service notion of energy companies does not exist. | 4. PV kits socially relevant, but too limited in scale; need for grid-connected systems, rooftop programs, and integrated PV in commercial buildings | 4. Simplify it procedures, too complex, cumbersome, and theoretical. | 4. Grid – Off-grid analysis would be useful too. |
| 5. Conventional energy enjoys large subsidies | 5. hybrid diesel/PV plants at 10 MW scale for isolated grids. | 5. WB in the role of advisor should use more industry experts with hands-on experience rather than academics and consultants. | |

Respondent Name, Title & Company: Frank van der Vleuten, General Manager, Free Energy Europe, The Netherlands

Type of company: Private energy company

Business and Technology Specialty: Project developer and PV module manufacturer (amorphous silicon, modules of <20 Watts)

Indicative Project: Market development in Africa

| Major Barriers to Scaling-Up of RE in developing economies? | Successful Business Models/Strategies | What should be the WB Role in assisting RE scale-up | Suggested Content for the Handbook |
|---|---|--|--|
| 1. Lack of qualified rural people; the PV distribution capacity needs to build up from the bottom, using rural people; how to identify qualified people, to train them, and how to work with them. | 1. Business model should be bottom up, supporting the rural businesses throughout the supply chain, with training and possibly some limited financial support. | 1. Stop being a “Bank” for now, but focus on creating the right conditions (regulatory framework, technical and financial capacity at rural level, awareness among potential end-users); only when there is sufficient capacity you may act as a Bank by providing the funds for scaling up. | 1. Must address the rural business man and technician; should not be for the government or university educated; a practical knowledge base is what is needed, all abstraction (such as CO2 emissions) should be left out. Concentrate on how the rural PV business could work. |
| 2. Most PV programs only pay attention to financing and TA, whereas education of the rural end-user is more important. This must change for accelerated uptake of PV systems. | 2. Be patient. It takes time to create rural capacity; expect the first few years not too much business; it will pick up later. Most GEF supported projects intended to develop the market in 3 years, which is not possible. | 2. Stop believing in “trickle down theory”. Installing PV systems in institutions does NOT automatically develop the market for household systems. | 2. Standard contracts, standard project proposals, sample business plans, again with a focus on the small rural businesses |
| 3. Multinational PV manufacturers spoil the local markets; they only offer large systems that need a subsidy as they are not affordable to most end-users; smaller systems can be sold without subsidies, but now | 3. Start small, build up gradually. Search for solutions at the rural level, and scale up only when these solutions are fully tested and adapted. | 3. Search for internal solutions how to better support small-scale rural businesses. | 3. Finding the right partners is more important than using the right project proposal format. |

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| people expect subsidies. | | | |
| 4. Most PV programs build capacity for the wrong clients - large importers with offices in the capital rather than local providers in rural areas. Most programs are too conservative, are not flexible, and do not support the right stakeholders. In fact, these programs become a barrier to market development. | | | |

Respondent Name, Title & Company: Marius Boogert, Global Sales Director Off-Grid, Shell Solar, Germany

Type of company: Private energy company

Business and Technology Specialty: Project developer; sale and manufacture of PV modules

Indicative Project: Fee for Service rural electrification project in South Africa; World's largest solar park - Leipzig, Germany

| Major Barriers to Scaling-Up of RE in developing economies? | Successful Business Models/Strategies | What should be the WB Role in assisting RE scale-up | Suggested Content for the Handbook |
|---|---|--|--|
| 1. There is a lack of local finance; back-up for local banks would be useful | 1. There should be better tender procedures; such as open procedures which lead to a selection of three companies that can implement activities they proposed | 1. Have a more neutral view towards solar electricity; let the results count, don't pre-select the technology | 1. We already have a Design Engineering Practice manual and don't need more toolkits. |
| 2. Lack of capable local partners; governments are unreliable and are prone to change the rules halfway implementation of a project | 2. More support for market-based initiatives | 2. Ensure a supportive regulatory framework (governments that have a consistent policies; no import duties, etc) | 2. Risk of generally applied toolkit is that they become a bureaucratic burden. Toolkit should not be a burden to implementation |
| 3. Tender procedures are poorly organized: contracts are awarded | 3. More support for local companies and their initiatives | 3. More support for micro-finance; assist local banks in | 3. One reason for a toolkit could be to verify/check |

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| <p>but not implemented; there is too much emphasis on price instead of quality; when poor equipment is chosen, project fail due to lack of quality and this has negative impact on companies that provide good equipment; because of the expectations around a large tender, new companies are created without any experience – who often obtain a contract but fail to deliver; markets are sometimes disturbed by large tenders.</p> | | <p>setting up and maintaining micro-finance mechanisms</p> | <p>minimum conditions to be satisfied by local businesses in this field</p> |
| | | <p>4. Better quality control for tender procedures; they should be correctly implemented and completely followed through.</p> | |
| | | <p>5. Support for local structure</p> | |

North American Solar PV Industry

Respondent Name, Title & Company: Greg Rosen, VP Marketing, PowerLight Corporation

Business and Technology Specialty: Manufacturer and project developer of integrated building and stand-alone PV systems

Indicative Project: 10 MW tracking PV array in Bavaria (largest in the EU)

Suggested Case Study for Handbook Inclusion: Overcoming start-up costs in getting in the PV business

| Major Barriers to Scaling-Up of RE in developing economies? | Successful Business Models/Strategies | What should be the WB Role in assisting RE scale-up | Suggested Content for the Handbook |
|--|---|--|--|
| 1. Steady sources of incentives or subsidies necessary to offset higher first cost of PV | 1. Portfolio approach to generation expansion with “carve-outs” for renewables including PV | 1. Table setting: creating the sector environment conducive to equal consideration of renewables | 1. Financing sources and how to access them. |
| | 2. Incentives/encouragement/recognition of extra benefits of distributed generation solutions | 2. Help to lower market entry costs | 2. Business listings that will help identify institutions and organizations helpful in finding opportunities & structuring deals |
| | | 3. Encourage private sector capacity building & SME creation. This would include active outreach and encouragement to RE start-up companies. | 3. A guide to market entry for businesses interested in the RE market |

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| | | | 4. Compendium of project including identification of key project players (lending institute, local partner, etc) |
| | | | 5. Overview of market opportunities, Assessment of the developing world market country-by-country. |

Respondent Name, Title & Company: Christopher O'Brien, VP Strategy and Government Relations, Sharp Solar Systems Division

Business and Technology Specialty: Manufacturer and project developer for solar PV components and systems

Indicative Project: Developing new PV products (e.g. thin film amorphous silicon)

Suggested Case Study for Handbook Inclusion:

| Major Barriers to Scaling-Up of RE in developing economies? | Successful Business Models/Strategies | What should be the WB Role in assisting RE scale-up | Suggested Content for the Handbook |
|--|---|---|--|
| 1. Capital cost and financing | 1. For small-scale systems (SHLK), create critical mass for manufacturers – standard design across regional programs, system-level certification to assure quality, marketing support to promote use | 1. Facilitating Country Development Plans. Providing training for those officials and consultants who are responsible for PV and other renewable energy technologies that are available for applications in each of the development sectors (e.g. health, telecommunications, etc). | 1. The handbook should be to increase awareness of potential PV and other renewable technology solutions for specific development sectors, and to provide sufficient substance (e.g. financial analysis) to make it easier for PV /renewable applications to be identified and funded. . |
| 2. Marketing and consumer awareness | 2. For larger-scale systems, establish a "standard offer" power purchase agreement designed to motivate PV project developers. PPA should be long-term (commensurate with the expected PV system) and the energy rate will need to reflect a premium over be wholesale electricity prices that is justified by the zero fuel supply risk and zero emissions for PV systems. | 2. Procurement opportunities. Encourage adoption of standardized PV systems designs across regions to keep costs down and achieve economies of scale. Make readily available to PV industry a monthly or quarterly report on procurement opportunities in World Bank (and other multilateral) funded projects | |
| 3. Assurance of performance and reliability | | | |

Respondent Name, Title & Company: Neville Williams, Founder, SELCO

Business and Technology Specialty: Manufacturer and “solar services company”, specializing in solar PV applications

Indicative Project/Product: Established SELCO India, a manufacturer and distributor of solar PV systems all over India.

Suggested Case Study for Handbook Inclusion: India PV business development (35,000 HHs, 25 solar centers in small rural towns. Contact selco-india.com for more information.

| Major Barriers to Scaling-Up of RE in developing economies? | Successful Business Models/Strategies | What should be the WB Role in assisting RE scale-up | Suggested Content for the Handbook |
|---|---|---|---|
| 1. Subsidies/soft loans for delivery of grid power. | 1. Locally owned but foreign invested commercial solar svcs companies | 1. Work with Gov't to mainstream support & funding of Renewables | 1. Technology info on PV is not needed. Stress importance of institutional arrangements & delivery mechanisms |
| 2. Large WB projects w/ soft loans sometimes freeze the marketplace as buyers delay anticipating cheaper access | 2. Rural-based distributor networks that build credibility & allow grassroots marketing efforts | 2. Support consumer financing mechanisms so people can finance PV purchases | 2. Examples of RE enterprises & compendium/atlas of RE projects & REDCOs (Renewable Energy Delivery Companies) around the world. |
| 3. Lack of consumer credit systems | 3. Branding of solar as reliable, affordable, credible | 3. Encourage power sector reform, esp. rural electrification that allows off-grid solutions | 3. Examples of public-private partnerships |
| | | | 4. Primer on other technology options for grid and off-grid rural power |
| | | | 5. Consider teaming with IFC to put together a joint RE handbook. This could include case studies of RE business models that have worked. |

Respondent Name, Title & Company: Roger Little, President, The Spire Corporation
Business and Technology Specialty: Manufacturer of assembly line equipment for PV modules, PV factory construction

Indicative Project: Established PV manufacturing facilities in China, Katmandu, and Ulan Bator

Suggested Case Study for Handbook Inclusion: Inner Mongolia – WB-supported \$250 million PV project for nomadic tribes

| Major Barriers to Scaling-Up of RE in developing economies? | Successful Business Models/Strategies | What should be the WB Role in assisting RE scale-up | Suggested Content for the Handbook |
|--|---|--|---|
| 1. Financing | 1. Accessing soft loans and grant assistance | 1. Continue providing access to financing for procurement of RE goods and services | 1. Review of the commercial readiness and performance of various solar PV schemes (ie. Crystalline silicon vs. thin film). Present what works, what has been approved/certified, what is the status of advanced technologies. |
| 2. Local technical and business capacity building | 2. Stimulating the market – creating the demand for local manufacture | | |
| 3. Technology IP and leakage issues | 3. Providing resources to local entrepreneurs | | |

Respondent Name, Title & Company: Richard Blieden, Senior VP, United Solar Ovonics, LLC

Business and Technology Specialty: Manufacturer of solar PV systems

Indicative Project/Product: Unikit 32 and 64 W packaged solar house lighting kits

Suggested Case Study for Handbook Inclusion: Uganda solar village project. See paper by John Ssemanda of Solar Energy Uganda

(<http://solstice.crest.org/renewables/prsea/pdf/newslet10.pdf>)

| Major Barriers to Scaling-Up of RE in developing economies? | Successful Business Models/Strategies | What should be the WB Role in assisting RE scale-up | Suggested Content for the Handbook |
|--|--|---|---|
| 1. Financing. Need is there, technology available – Only financing is lacking. | 1. Identifying and overcoming gaps between affordability & project costs via cofinancing or subsidies. | 1. Uganda village program a good example; WB/GEF provided subsidies of \$2.50/W | 1. How to design in sustainability (supporting, maintaining systems) |
| | | | 2. Institutional arrangements and local capacity requirements |
| | | | 3. Anti-theft and anti-vandalism |
| | | | 4. Integrated in-building systems |
| | | | 5. Descriptions of applications, primer on typical project parameters (cost, performance, size) |

European Wind Power Industry

Respondent Name, Title & Company: Roberto Vigotti, Responsible International Relations, ENEL International, Italy

Type of company: Private energy company

Business and Technology Specialty: Developer of power plants (wind, hydro, geothermal)

Indicative Project: Take-over mergers of (conventional and renewable energy) power plants in South America, currently in Slovakia

| Major Barriers to Scaling-Up of RE in developing economies? | Successful Business Models/Strategies | What should be the WB Role in assisting RE scale-up | Suggested Content for the Handbook |
|---|--|---|--|
| 1. Lack of good policy for efficient functioning of markets | 1. Merger position, take over; develop strategic opportunities for gradually taking over geothermal, hydro, wind plants in various neighboring countries | 1. provide easier risk guarantees | 1. Policy measures, examples |
| 2. Lack of capacity in countries (financial infrastructure, governance) | 2. Greenfield operation | 2. be a credible broker, particularly with respect to CDM mechanism | 2. clear update on base line situation, chances for success with CDM |
| 3. Kyoto mechanisms too complex; need for simplification | 3. in close collaboration with local partners, choosing technology really well | 3. Push policy reform | 3. Case studies |
| 4. lack of hard resource data | | 4. provide local capacity building | 4. regular updates on mechanisms and technologies |

North American Wind Power Industry

Respondent Name, Title & Company: Mike Bergey, Owner, Bergey Wind Power
Business and Technology Specialty: Small wind power manufacturer and consultancy.

Indicative Project: Bergey subsidiary in China manufacturing wind turbines; tech transfer license in Australia

Suggested Case Study for Handbook Inclusion: CNE in Chile and DOE did a windpower scheme on Islay Tac in the Chiloe Islands. See project listings on www.bergey.com or http://www.rsvp.nrel.gov/pdfs/briefs_2000/chile.pdf

| Major Barriers to Scaling-Up of RE in developing economies? | Successful Business Models/Strategies | What should be the WB Role in assisting RE scale-up | Suggested Content for the Handbook |
|---|---|--|---|
| 1. Imbalance in provision of subsidies in favor of conventional, grid-connected approaches | 1. Recognize that all rural electrification requires subsidies: issue is to how to equitably consider all electrification options | 1. Help accelerate consideration of DG by providing for some early entry points through pilot projects etc | 1. General guidance on technology selection. Simple decision trees to help guide the planning process. |
| 2. Stovepipe approach to renewable energy | 2. Adaptation of least-cost principles to rural electrification | 2. Help rationalize the electrification planning process, introduce new methods that can embrace DG, RE | 2. Rural power project preparation primer. Checklist or template for project development. |
| 3. Assumption that infrastructure leads to development of markets, when in fact the reverse is more nearly true | 3. Recognize that RE is disadvantaged because it doesn't electrify as many HHs per expenditure as diesel. Take a leveled approach to quantifying delivered energy that reflects the higher operating costs of diesel. | | 3. Planning models, such as the Hybrid II model from NREL. Compendium of planning models and analysis tools for rural power planning. |

Respondent Name, Title & Company: Jim Lyons, Advanced Technology Lead Engineer, GE Energy

Business and Technology Specialty: Manufacturer and project developer of utility-scale wind turbines

Indicative Project: Inner Mongolia, China and India utility-scale wind installations

Suggested Case Study for Handbook Inclusion:

| Major Barriers to Scaling-Up of RE in developing economies? | Successful Business Models/Strategies | What should be the WB Role in assisting RE scale-up | Suggested Content for the Handbook |
|--|--|---|--|
| 1. Institutional arrangements – Power Purchase Agreements, streamlined permitting procedures | 1. Renewable Portfolio Standards | 1. Help levelize the playing field with diesel sets, which often undercut RE on first cost but have much higher life cycle cost | 1. Market assessments of the several wind markets by country – village power, utility scale wind, remote |
| 2. Financing – how to get the necessary ROR | 2. Creating the markets through demonstration projects and products suited to country conditions | 2. Help create enabling conditions for RE participation in power sector development, especially transparency, availability of off-taker contracts and agreements allowing bankable projects | |
| | 3. Building national supply and distribution networks to support market development | 3. Pilots of both technologies and delivery mechanisms | |

Respondent Name, Title & Company: Jito Coleman, President, Northern Power Systems

Business and Technology Specialty: Manufacturer of wind and PV remote power systems, technology licensing

Indicative Project: Provided renewable (PV) systems for valve operation, communications, cathodic protection for the last four large pipelines (Azerbaijan, Bolivia-Brazil, Kazakhstan) built in the world.

Suggested Case Study for Handbook Inclusion: E-7-sponsored rural power program in Chile. Also: Larry Flowers of NREL has a project listing of all the PV and wind projects implemented between 1995 and 2002.

| Major Barriers to Scaling-Up of RE in developing economies? | Successful Business Models/Strategies | What should be the WB Role in assisting RE scale-up | Suggested Content for the Handbook |
|---|--|---|--|
| Entrenched grid mentality on rural electrification. Any developing economy without an existing large central grid should consider leapfrogging to electrification via distributed generation. | Identifying niche applications that are tailor-made for RE and DG, such as the high-value end-uses on remote pipelines. | Look at smaller projects or allow for smaller sub-projects within large, lumpy WB electrification projects. | Actual examples of arrangements that worked and didn't work within projects. Real-live, nitty-gritty systems descriptions and diagnosis. |
| Access to financing. | Allowing for human infrastructure needed for infrastructure sustainability | Build local capacity through encouraging formation of local practitioner companies and provision of training. | Longitudinal review of project operations (i.e. over time). How does the project perform 5 or 10 years later? |
| Awareness of the potential of DG and RE. | Finding Commercial clients. Village power applications tend to have poorer economics, while still costing a lot to design & build. | Provide subsidies to RE solutions for village power or DG. | Social, institutional, technical lessons learned. |
| | | Piloting models and arrangements that provide for more sustainable projects. | |
| | | Integrated, cross-sectoral programs, esp. with forestry | |

European Biomass Industry

Respondent Name, Title & Company: Hans Jørn Clausen, Sales Manager; Bioener APS, Denmark

Type of company: Private energy company

Business and Technology Specialty: Manufacture, design, implementation of biomass power plants;

Indicative Project: Biomass power in Eastern Europe

Suggested Case Study for Handbook Inclusion: see their website for examples in Europe; also, Biopower report by WWF

| Major Barriers to Scaling-Up of RE in developing economies? | Successful Business Models/Strategies | What should be the WB Role in assisting RE scale-up | Suggested Content for the Handbook |
|--|--|--|--|
| 1. Governments are behind in terms of legislation and guidelines promoting the use of renewable energy | 1. There should be a local driving force promoting renewable energy; mainly a government institution with the task to promote and facilitate the use of renewable energy and provide information | 1. Address legislative framework, make sure it is in favour of renewable energy | 1. Above all case studies from different countries and different technologies, demonstrating the possibilities for replication |
| 2. Subsidies promoting renewable energy use are lacking | 2. Subsidies are needed to close the gap in economic performance between renewables and fossil fuels, as is regularly done in European countries. | 2. Provide information about the possibilities and justification of renewable energy | 2. NO technical information, that is known already; the WWF recently issued a very good Biopower report. |
| 3. Technical infrastructure is often weak | 3. Make guarantees and long-term loans more easily accessible. | 3. Easier access to guarantees and long-term loans. | 3. Propose standards, related to the quality of different biomass fuels |

Respondent Name, Title & Company: Silvia Vivarelli, Biomass Expert; ETA Renewable Energies, Italy

Type of company: Private energy & research company

Business and Technology Specialty: Biomass, PV, wind projects, both project implementation and development & research;

Indicative Project: Transnational renewable energy projects in Eastern Europe

| Major Barriers to Scaling-Up of RE in developing economies? | Successful Business Models/Strategies | What should be the WB Role in assisting RE scale-up | Suggested Content for the Handbook |
|---|---|--|--|
| 1. renewable energy technologies are complex and more expensive; lack of support mechanisms to over come this (both in terms of research as in terms of buy down the incremental costs) | 1. Inform & influence decision makers about the advantages of renewables (environment, local resource, security, etc), over come political problems | 1. Provide reliable data on energy resources and on appropriate energy technology choices; | 1. how to obtain financing for renewables |
| 2. Lack of data on available renewable energy resources | 2. Better involve local people | 2. Better involving local communities | 2. how to chose the best technology |
| 3. Lack of knowledge among decision makers and investors | 3. Distributed generation, using smaller plants (10 MW range) | 3. Provide micro-finance | 3. where to find experts |
| 4. Not conducive legislative framework | | 4. Improve policy & regulatory framework in client countries | 4. economic analysis |
| | | 5. only support proven technology | 5. how to involve local actors (private, public) |

North American Biomass Industry

Respondent Name, Title & Company: Rob Walt, Founder, Community Power Corp.

Business and Technology Specialty: Manufacturer and project developer of modular biomass-power devices

Indicative Project: China rural power projects, Philippines rural enterprises power infrastructure

Suggested Case Study for Handbook Inclusion: Philippines village power project

| Major Barriers to Scaling-Up of RE in developing economies? | Successful Business Models/Strategies | What should be the WB Role in assisting RE scale-up | Suggested Content for the Handbook |
|---|---|--|--|
| 1. Financing, either through grants or loans | 1. Enterprise-driven rural electrification, in which emphasis is on income-generating end-uses. HH electrification comes later. | 1. Create a competitive environment and manage sector risks so that you attract large private sector players | 1. Technology information on the full RE portfolio, including small modular biopower |
| 2. Very rarely is the user able to finance; therefore, third party financing needed | 2. In the US, combined power and heat/community cogeneration schemes | 2. Address policies and restrictions, esp. those that discriminate against DG or RE | 2. Designing sustainable projects. Evaluations of actual projects, with lessons learned and scoring. Revisits to projects after 5, 10, 15 years with reports on sustainability. Tips on minimizing project risk and building in sustainability incentives. |
| 3. Credibility of RE, especially biomass, as there have not been that many successful projects. | 3. Seek out high-value rural applications, such as refrigeration | 3. Create opportunities to access financing | 3. Market intelligence on specific countries - size of the RE resource, status of Gov't programs, WB projects, etc. |
| | | | 4. Useful business information: contacts, NGOs, RE company listings, networking opportunities. |

European Hydropower Industry

Respondent Name, Title & Company: S. K. SHARMA, Director India, Guggler Ltd.

Type of company: Private energy company

Business and Technology Specialty: Hydro projects;

Indicative Project: several small (10 MW range) and larger plants in India and Latin America

| Major Barriers to Scaling-Up of RE in developing economies? | Successful Business Models/Strategies | What should be the WB Role in assisting RE scale-up | Suggested Content for the Handbook |
|--|--|--|--|
| 1. Abnormal delays in obtaining statutory clearances from Govt. agencies | 1. Streamlining formalities in sanctioning and disbursement of loan by the financial institutions | 1. Only financial institutions with a presence in hydel potential areas should be selected to administer the programme. Looking to the magnitude of programme there is need for many such financial institutions in each country. | 1. Surveys & Investigations – nature and extent to be specified. |
| 2. Absence of competent civil contractors with financial, managerial and plant & machinery resources for SHP works in India. | 2. Allow developers to do civil works departmentally with their own engineers, plant and machinery and contract labour. This will ensure quality work, and no time and cost over-runs. | 2. The prevailing procedure observed by the financial institutions needs to be stream lined and time table fixed in sanctioning and disbursement of loan to developers. Presently it takes years after loan sanction to disburse the loan. | 2. Design standards for civil & E& M Works appropriate to SHP. |
| 3. Too few turbine manufacturers (about three only) having out-dated technology and monopolistic attitudes. Developers are at their mercy. No after sales services. | 3. Encourage new turbine and SHP equipment manufacturers through financial incentives. | 3. The moratorium should be reckoned from the date of first disbursement and not from the date of loan sanction. | 3. Selection of power house equipment. |
| 4. Imported E & M package much costlier. | 4. Encourage erection, commissioning, operation and | 4. Liberal and cheap financial assistance to all sectors of SHP | 4. Appropriate construction practices and |

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| | maintenance groups in SHP through liberal financial incentives. | development | techniques |
| | | 5. Independent appraisal of potential sites, present equipment manufacturing facilities, and availability of trained manpower and new facilities required by World bank through national and international consultants and institutions. | 5. Erection, commissioning, operation and maintenance aspects and know-how. |

Respondent Name, Title & Company: Andrew Scanlon; Chairman Sustainability Committee Hydropower Association; Hydro Tasmania

Type of company: Private not for profit association representing and promoting the interests of hydro industries globally.

Business and Technology Specialty: Hydro projects;

Indicative Project: developed a sustainability handbook for the hydro industry association

| Major Barriers to Scaling-Up of RE in developing economies? | Successful Business Models/Strategies | What should be the WB Role in assisting RE scale-up | Suggested Content for the Handbook |
|--|--|--|---|
| 1. Inertia to embrace renewables; lack of vision | 1. Understanding the framework that is in place, and if the model fits the framework | 1. Since Johannesburg, Kyoto, and Bonn: for hydro, there is mainly talk about quality, not size; but the World bank limits its intervention according to size. This should change into good quality only, size being determined by the local circumstances | 1. Three issues should be covered: (i) principles (quantity, quality), balance of risk (public, private), ensuring highest domestic component, maximize value); |
| 2. Perception of those on the ground may be different from what is proposed under large- | 2. Building into a model: maximizing local partnerships, strong commitments | 2. Prioritize; analysis of options, life cycle analysis, ensure level playing field; | 2. (ii) templates (how to structure the project), options |

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| <p>scale programs. Political selectivity; national or regional priorities may differ based on political realities</p> | <p>from the public sector</p> | <p>maximizing local components and benefits, nurture local stewardship; ongoing commitment to operate and maintain systems</p> | <p>assessment, analysis of contracts (what to expect from a Guarantee, Power Purchase Agreement, Carbon Credits, etc), impact assessment, sustainability management plan</p> |
| <p>3. Lack of framework for development; need for streamlining procedures, simplified processes</p> | <p>3. Clearly define benefits, impacts & management plans; and contracts. Clarify carbon credits; cross-currency agreements. Each project should pave the way for the next proposed project.</p> | <p>3. Create fund for uncertainty. clarify resource potential, clarify life-cycle emissions of large-scale hydro</p> | <p>3. Case studies on key issues and lessons learnt; financing examples; maintenance experience; actual returns on investment</p> |
| <p>4. Lack of investment interest because of risks (political and economic stability, high upfront costs, uncertainty about carbon credits/financial models used)</p> | | <p>4. guarantee that back-up technologies are integrated and issues are well understood (storage, wind, etc).</p> | |
| <p>5. information about: hydro resources; level of service; data lack confidence</p> | | | |
| <p>6. infighting between technologies and in certain countries, strong case is being made for nuclear</p> | | | |

Respondent Name, Title & Company: Richard Taylor; Executive Director, International Hydropower Association;
Type of company: Private not for profit association representing and promoting the interests of hydro industries globally.
Business and Technology Specialty: Hydro, wind energy projects;
Indicative Project

| Major Barriers to Scaling-Up of RE in developing economies? | Successful Business Models/Strategies | What should be the WB Role in assisting RE scale-up | Suggested Content for the Handbook |
|---|--|---|---|
| 1. Environmental issues | 1. Overcome regulatory risks | 1. Provide several mechanisms to ease funding arrangements and reduce risks | 1. Hydro and wind are already sufficiently covered elsewhere, same for sustainability guidelines. |
| 2. Social impacts (resettlement) | 2. Provide good policy framework for the use of renewables | 2. Recognize long-term benefits of sustainability, green energy | 2. Toolkit for governments; to emphasize environmental and social requirements |
| 3. Financial risks (delays, cost overruns with implementation) | 3. Better use of international trade of carbon | 3. Working with governments to improve and clarify policies, regulatory framework | 3. Toolkit to include financial aspects; how governments can assist developers and vice-versa |
| 4. Legal and regulatory framework in country; absence of good strategic assessment of energy sector priorities and strategy for development | 4. Make better use of multipurpose benefits | 4. Working with governments to identify good opportunities for renewables | 4. How to avoid and deal with bribery |
| 5. Unreliable governments (corruption) | | 5. Issue reliable long-term resource assessments (wind, hydro) | 5. Financing of small projects |

North American Hydropower Industry

Respondent Name, Title & Company: Balraj Varma, Vice President, Dodson-Lindblom International, Inc.

Business and Technology Specialty: Project developer and operator of hydropower projects

Indicative Project: 12 MW project in Maharashtra, 2 MW project in Madhra Pradesh, many other projects in India

Suggested Case Study for Handbook Inclusion:

| Major Barriers to Scaling-Up of RE in developing economies? | Successful Business Models/Strategies | What should be the WB Role in assisting RE scale-up | Suggested Content for the Handbook |
|---|--|---|--|
| 1. Financing generally. Strict financing criteria | 1. Tailoring the evaluations and financing criteria to reflect project diversity. | 1. Build capacity, esp. on the public side. | 1. Include a guide to the FS and project evaluation steps. Help developers and others understand how projects are evaluated and appraised. |
| 2. Lack of sufficient technical information or hydrological data to make good investment decisions. | 2. No single entity can take on all the project risk. Need to develop streamlined procedures and model project parameters. Public-private partnerships are essential for this to happen. | 2. Increase awareness of small hydro benefits and issues for both officials and lenders. | 2. Model procedures and rules for adoption by bureaucrats. This would include PPAs, license terms, etc. |
| 3. Gov't not used to doing small projects. | 3. Provide small hydro with the same terms and subsidies afforded to wind and solar PV. | 3. Develop integrated projects whereby national or local government can undertake the investment in non-project related infrastructure. | 3. Model contracts and terms for loans and lending institutions, with variations for each technology. |
| 3. Lack of or poor PPAs make financing difficult. | | | |
| 4. Sometimes the licensing requires develops to invest in | | | |

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| non-related infrastructure, such as roads, that is not essential to the project. | | | |
|--|--|--|--|

Respondent Name, Title & Company: Paul Berkshire, President Hydro West
Business and Technology Specialty: Project developer for small hydropower
Indicative Project: Guatemala - several 10-50 MW projects under development.
Suggested Case Study for Handbook Inclusion: Rio Hondo II privately-funded merchant power plant (1000 m head), made possible by the recently-enacted Guatemala Renewable Energy Law encouraging privately-financed hydro schemes (<http://www.us-hydropower.org/Documents/Guatemala.pdf>)

| Major Barriers to Scaling-Up of RE in developing economies? | Successful Business Models/Strategies | What should be the WB Role in assisting RE scale-up | Suggested Content for the Handbook |
|--|---|--|--|
| 1. Lack of financing | 1. Accessed venture capital markets to undertake first-ever merchant hydro plant in Latin America | 1. Create conditions that minimize risk, maximize transparency, help convince management to make investments. | 1. Hydropower awareness: emphasize that hydro comes in all shapes and sizes and forms – not just large hydro with social impacts. |
| 2. Lack of financial, price, or off-take volume guarantees via PPAs or other instruments | | 2. Overseas Private Investment Corp | 2. How to anticipate and minimize “soft costs” – safeguards and social impacts assessment, etc. |
| 3. Diesel is too-often selected because it is a quick, dirty, & fungible energy source | | 3. Encourage utilities or gov’t to accommodate PPAs, as they are needed to support long-term lending. | 3. Fundamentals of hydrology and dam design. Catchment vs. run of the river. Reservoir size vs. impact. |
| | | 4. How to monetize the secondary or ancillary benefits (flood control, irrigation, recreation) of hydropower schemes in a private investment setting. Creating public-private sector partnerships to accommodate this. | 4. Describe ideal or necessary regulatory regimes and enabling conditions for hydropower project development. How have the public benefits accruing to private sector schemes been accommodated? |

North American Solar Thermal Industry

Respondent Name, Title & Company: Gilbert Cohen, VP Marketing, Solargenix
Business and Technology Specialty: Manufacturer and Project Developer of Solar Thermal Electric & Process Heat Applications

Indicative Project/Product: Qualified bidder on a GEF-financed combined cycled STEC project in Morocco

Suggested Case Study for Handbook Inclusion: State of Nevada, USA – negotiated renewable resource portfolio requirement with utility supplier

| Major Barriers to Scaling-Up of RE in developing economies? | Successful Business Models/Strategies | What should be the WB Role in assisting RE scale-up | Suggested Content for the Handbook |
|---|---------------------------------------|---|---|
| 1. Overspecified & burdensome procurement documents | | 1. Mobilizing grant assistance through GEF or other CDM | 1. Basic data needed to understand RE market opportunities in different countries |
| 2. Creditworthy off-takers | | 2. Creating conditions conducive to lending | 2. Power development plans for each country |
| 3. Lack of financial guarantees in the form of PPAs or other long-term instrument | | | 3. Market assessments |
| | | | 4. Business development aids, such as lists of local specialist companies |

Respondent Name, Title & Company: David Saul, COO, Solel Inc (Tel Aviv)

Business and Technology Specialty: Manufacturer and Project Developer of Solar Thermal Electric & Process Heat Applications

Indicative Project/Product: They produce 85% of the Solar Thermal Electric Power in California

Suggested Case Study for Handbook Inclusion:

| Major Barriers to Scaling-Up of RE in developing economies? | Successful Business Models/Strategies | What should be the WB Role in assisting RE scale-up | Suggested Content for the Handbook |
|--|--|--|---|
| 1. Ability to get long-term PPA | | 1. Help in creating conditions for long-term, stable revenue stream that makes for bankable projects | |
| 2. Economies of scale needed to bring down unit costs | 2. Subsidized pilot projects to help bring down costs and prove-out technology | 2. Help identify, manage, allocate project risk | |
| | | 3. Provide initial project pipeline | |

European Geothermal Industry

Respondent Name, Title & Company: Christian Kornevall; Director Sustainability Affairs, ABB, Switzerland

Type of company: Private engineering company

Business and Technology Specialty: Conventional energy, hydro projects, geothermal;

Indicative Project: wind power

| Major Barriers to Scaling-Up of RE in developing economies? | Successful Business Models/Strategies | What should be the WB Role in assisting RE scale-up | Suggested Content for the Handbook |
|---|---|---|---|
| 1. price | 1. basic investment need to be developed | 1. finance | 1. kitchen stoves for India |
| 2. customer demand | 2. enter into partnerships (i.e. ABB's access to electricity project) | 2. pricing models | 2. a case for each technology – wind, solar, biomass, tide power, etc |
| 3. lack of grid connections | 3. support with planning of project development | 3. framework agreements | |
| 4. access to aid budgets | 4. fair and controlled bidding in LDCs | 4. project development | |
| | 5. CDM and other mechanisms | | |

North American Geothermal Industry

Respondent Name, Title & Company: David Citrin, VP-Business Development, Ormat

Business and Technology Specialty: Manufacturer and developer of BOT, BOO, and BOOT geothermal IPP projects

Indicative Project: Geothermal projects in Kenya, Guatemala, Nicaragua, Philippines, Ethiopia, Thailand, Uganda

Suggested Case Study for Handbook Inclusion: Fast-tracked BOT projects undertaken in the Philippines in the mid-1990s with a private-public partnership approach.

| Major Barriers to Scaling-Up of RE in developing economies? | Successful Business Models/Strategies | What should be the WB Role in assisting RE scale-up | Suggested Content for the Handbook |
|---|---|--|--|
| 1. There are only a few countries in which geothermal is the least-cost option. Need mechanisms to make RE affordable compared with conventional sources. | 1. Private-public partnerships that build local capacity for the preliminary exploration and prospecting necessary to identify economical geothermal resources. | 1. Multi-laterals should work with Gov't to develop long-term solutions, esp. as regards first-cost hurdles of RE. | 1. Include information useful to utilizes considering grid-connected RE options. |
| 2. Other short term priorities – keeping prices low, keeping up with demand growth – tend to outrank scale-up of RE. | 2. Renewable portfolio standards as a powerful market entry mechanism, either through price subsidies or a quota system. | 2. Create streamlined procedures for permitting, licensing, etc. | 2. Examples, especially of successful private-public partnerships. |
| 3. Lack of institutional capacity and political will on the part of Governments | | 3. For a given country, harmonize/coordinate the energy strategies across IFIs and donors (in some instances IFC may promote one strategy and WB another...) | |
| | | 4. TA and capacity building to support the up-front work required to prove out geothermal resources. | |
| | | 5. Methods to support private sector projects, | |

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| | | perhaps through on-lending or creation of revolving funds. | |
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European Financial Institutions

Respondent Name, Title & Company: Nick Gardiner; Director Energy Finance Group; Fortisbank, UK

Type of company: Private Bank

Business and Technology Specialty: provide financing;

Indicative Project wind energy projects, mainly in Europe

| Major Barriers to Scaling-Up of RE in developing economies? | Successful Business Models/Strategies | What should be the WB Role in assisting RE scale-up | Suggested Content for the Handbook |
|--|--|--|--|
| 1. standardization (approach, documents) | 1. Fortisbank comes in the picture only when the project is ready to be financed; they would like: | 1. overall grid development, infrastructure | 1. standardized procedures, standards, examples |
| 2. regulatory framework, confidence in stable situation | 2. standardization of procedures | 2. support underpinning regulatory framework; reduce risks for investors | 2. examples of projects, understanding the regulatory issues |
| 3. lack of finance (not enough liquidity, result of lack of understanding of the real risks) | 3. pooling of projects (10 projects each size of Euro 5m) | 3. grants and cash only; development grants; | 3. contact information of different actors (and update this regularly) |
| 4. good infrastructure (electricity grid) | 4. more long-term financing | 4. be a conduit for information, an ambassador for renewables | 4. organize conferences (training, capacity building), depending on purpose, in developing countries (develop activities) or financial centres (raise financing) |
| 5. size of transactions too small | | 5. get export credit agencies (ECAs) involved | |

Respondent Name, Title & Company: Relks Atvars; Vice President Power and Environment; Hypovereinsbank, Germany

Type of company: Private Bank

Business and Technology Specialty: Financing of mostly wind technology; hydro, biomass, waste to energy;

Indicative Project: wind energy projects in Europe (80% of portfolio) and in Eastern European countries

| Major Barriers to Scaling-Up of RE in developing economies? | Successful Business Models/Strategies | What should be the WB Role in assisting RE scale-up | Suggested Content for the Handbook |
|--|---|--|--|
| 1. Legislative and Regulatory stability in developing countries | 1. Start small, generate interest and incentives for scaling up through both farmers and businesses | 1. Focus on stabilizing energy markets, making sure that legislation includes incentives for green, sustainable energy | 1. For the currently covered technologies no hand book is needed; HVB internally knows the issues and only works with trustworthy beneficiaries with whom it already has experience. |
| 2. Additional incentives are needed so that renewables obtain a good economic performance; | 2. Renew the business regulatory environment, ensuring that incentives such as tax credits, agric incentives are available. | 2. Make sure Kyoto protocol is implemented also in developing countries, directly as well as indirectly; make it a condition for WB assistance | 2. A handbook for emerging technologies would be welcome; even then it would be careful to undertake projects. Other, smaller (development) banks may effectively need a handbook for existing technologies. |
| 3. The grid infrastructure is often not sufficiently developed to easily absorb large-scale renewables | | | |
| 4. Stability of energy markets in developing countries | | | |

Respondent Name, Title & Company: Caroline van Tilborg; Head of Carbon Procurement Department, Rabo Bank NV, The Netherlands

Type of company: Private Bank

Business and Technology Specialty: Hydro, wind, biomass, energy efficiency, transport, and HFC; all CDM countries;

Indicative Project: CO₂ reductions in the Sugar industries in Brazil and India

| Major Barriers to Scaling-Up of RE in developing economies? | Successful Business Models/Strategies | What should be the WB Role in assisting RE scale-up | Suggested Content for the Handbook |
|--|--|--|---|
| 1. Regulatory framework not conducive; legal system dysfunctions | 1. More and different financing mechanisms should be available, particularly longer-term (more than 2-3 year) and for lower amounts appropriate to the level of rural businesses | 1. Ascertain correctness of regulatory environment | 1. Minimum criteria for activity selection should be included, not as evaluation tool but as guidelines |
| 2. Financial markets poorly developed, no liquidity, and lack of substantial own contributions | | 2. Provide seed capital to local banks; provide training to create better capacity to supply rural credit for small-scale activities (and entirely locally arranged) | 2. How local project developers/entrepreneurs can successfully approach a local bank for financing |
| 3. Risks cannot or only marginally be insured. | | 3. The measure of success is when there is no more need for financial support to the local banks, which have included renewable energy in their regular portfolio. | 3. Credit analyst should be brought up to speed on renewable energy activities |
| 4. Often track record of supplier or technology not reliable | | 4. Must be willing to descend to problem solving at the small-scale rural business level | |

Respondent Name, Title & Company: René Magermans; Sr. Investment Officer; Triodos Bank NV, The Netherlands

Type of company: Private Green Bank

Business and Technology Specialty: Financing of renewable energy and green projects;

Indicative Project: Manages the Solar Development Fund

| Major Barriers to Scaling-Up of RE in developing economies? | Successful Business Models/Strategies | What should be the WB Role in assisting RE scale-up | Suggested Content for the Handbook |
|--|---|---|--|
| 1. Lack of rural entrepreneurial capacity; either we may expect too much from rural businesses or we may want them to act too much in western ways | 1. Create specific local business councils (energy, finance) and organize capacity building, training and exchange of information for their members | 1. World Bank to work more closely with smaller development banks as equal partners | 1. Sample contracts; full texts of important legal, financial and other papers, with explanations why some of these clauses are important for the rural business |
| 2. Lack of long-term policies (macroeconomic, energy, subsidies) | 2. Specifically address the needs for small rural SME, particularly how they can be assisted by local MFI | 2. Clarify the role of subsidies (target groups; entry, exit, duration, exact start, etc), and ensure that they do not distort the market. | 2. Instead of a handbook, maybe a checklist of all aspects that need coverage during project preparation and implementation |
| 3. Lack of mechanisms to assist small-scale rural businesses, rural MFI, and rural project developers | 3. Have more local representation, throughout the supply-distribution chain | 3. Exchange of experience and information for real practitioners including small-scale rural businesses (and not just intelligentsia as is often the case); awareness raising, training for the same group. PV businesses often remain “hobbyists” and they should become professionals | |
| 4. Renewable energy programs often distort the market for credit (not market-conform, too high subsidies, assisting only part of | 4. Better and more risk sharing for all partners, in-line with carrying capacity; | | |

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| the actors and not others) | | | |
| | 5. Market conform loans only; value added to be provided through the intrinsic network function & services of the Development Bank | | |

North American Financial Institutions

Respondent Name, Title & Company: Mike Davies, Managing Director, Free-Stream Capital, Ltd. (London)

Business and Technology Specialty: Arranging/brokering financing for wind power projects

Indicative Project:

Suggested Case Study for Handbook Inclusion:

| Major Barriers to Scaling-Up of RE in developing economies? | Successful Business Models/Strategies | What should be the WB Role in assisting RE scale-up | Suggested Content for the Handbook |
|---|---|--|--|
| 1. For grid-connected projects, the quality of the grid is a major issue. | 1. They stay away from developing economies! | 1. Upgrade the grid | 1. Market assessment of individual countries, especially grid conditions, power development plans, programs on offer. Etc. |
| 2. Creditworthiness of the off-takers | 2. Work with donors and government to overcome project risk and project financing barriers. | 2. Establish markets, encourage emergence of credit-worthy customers | |
| 3. Support mechanisms generally | | 3. Provide financial guarantees | |
| 4. Long term price stability, incl. indexing | | 4. Provide an anchor for development of private sector projects | |

Other (European) Institutions

Respondent Name, Title & Company: Olivier Schäfer; Policy Advisor; European Renewable Energy Council

Type of company: Not for profit private organization

Business and Technology Specialty: Representing and promoting European renewable energy industries;

Indicative Project

| Major Barriers to Scaling-Up of RE in developing economies? | Successful Business Models/Strategies | What should be the WB Role in assisting RE scale-up | Suggested Content for the Handbook |
|---|--|--|---|
| 1. Large development banks (WB, EIB, etc) mainly finance conventional energy, and big projects only. It is the SME that would allow the best scale-up, and they are interested in smaller projects. | 1. Finance institutions should change the focus of their intervention: clustering of smaller projects, provide more knowledge information exchange, and more capacity building | 1. Change the loan portfolio to include clustering of smaller (Renewable Energy) projects, | 1. export credit agencies and international banks' rules are too complicated; small companies do not make use of the mechanisms but large companies benefit most. The toolkit should address guidance on applying the rules from the point of view of SME |
| 2. Lack of knowledge about renewable energy; the notion that it is too expensive e.g., there are many circumstances that this is not so. | 2. A favourable policy framework in developing countries would attract private renewable energy players | 2. arrange for better knowledge information exchange, | 2. Country toolboxes, to assess risks |
| 3. SME are important players for renewables, but they cannot afford the same level of risks as large enterprises | 3. Better knowledge exchange, awareness raising in western countries | 3. provide more local capacity building, | |
| 4. Export Credit Agencies could play a large role but are not aware of the opportunities | | 4. ensure that policy frameworks support the use of renewable energy | |

Respondent Name, Title & Company: Ingrid Plag; Sustainability Advisor; Board Member NURA (South Africa) and YEELLEN KURA (Mali), the implementing agencies for Nuon's rural electricity activities; Nuon, The Netherlands

Type of company: Private energy utility

Business and Technology Specialty: Electricity, gas, and heat supplier

Indicative Project: Mali and South Africa PV electrification schemes

| Major Barriers to Scaling-Up of RE in developing economies? | Successful Business Models/Strategies | What should be the WB Role in assisting RE scale-up | Suggested Content for the Handbook |
|--|---|---|--|
| 1. Subsidies are needed for profitable activities | 1. Reliable governments | 1. Assist governments: good regulatory framework; capacity to deal with these issues | 1. mainly for governments, a checklist what to do, and minimum criteria (contracts, subsidies, technical, organizational, legislation, regulation, etc). |
| 2. Regulatory framework is inadequate | 2. Good policy environment + regulatory framework | 2. Better cross-fertilization than exist now (GVEP is not enough or not effective) | 2. not very useful for Nuon; |
| 3. Logistical problems for rural activities | | 3. WB should determine for itself how important Renewables are, and act on that | |
| | | 4. WB should also assist Western Governments (like DGIS) to see the light and carry out more activities on renewables (to satisfy the Millennium goals) | |

Respondent Name, Title & Company: Guy Marboeuf; Expert rural electrification, developing countries, Electricité de France (EdF)

Type of company: Corporation with one share holder (French Government; private shareholders will be invited to join soon)

Business and Technology Specialty: In developing countries: assistance to utilities, and village electrification (PV)

Indicative Project: Mali village electrification

| Major Barriers to Scaling-Up of RE in developing economies? | Successful Business Models/Strategies | What should be the WB Role in assisting RE scale-up | Suggested Content for the Handbook |
|--|--|--|---|
| 1. PV equipment is too expensive; limited availability; competition with other technologies | 1. Electricity sales is not the answer, but delivery of services. | 1. ensure a solid regulatory framework (electricity code; energy laws, no monopolies, etc) | 1. The handbook should facilitate that all actors understand the issues at stake and are able to talk the same language |
| 2. Subsidies are needed to become financially viable. | 2. No dogmatic choices, but full menu of options. Clear rules, applied to all. | 2. Advice to governments about the approach to rural electrification | 2. sizing of the equipment (technical) |
| 3. Local conditions determine which of the options is the best | 3. Use external financial assistance, grants; to be used for investments and not recurrent/operational costs | 3. Implement more appropriate rules (procurement, subsidies) | 3. economic analysis of the options, incl. lifecycle analysis |
| 4. There is no level playing field (conventional vs renewables; different actors/financing mechanism) | | 4. Financing to make renewables competitive with conventional electricity supply | 4. energy planning, models for village electrification, etc. |
| 5. regulatory framework not favourable to promote renewables; governments set the rules, and we just follow; rules are often unclear, and do not apply to all actors equally . | | | 5. EdF has it's own handbook and toolkits and is willing to demonstrate these |
| 6. Donor programs should be technology neutral and not eliminate certain technologies (or parts of technologies) on forehand. | | | |

African Individual Responses (Kenya and Tanzania)

| Kenya Individual Respondent Detail | | | | | | |
|--|---|---|---|---|---|--|
| Name and address | Type of institution and area of specialization | Future plans to expand renewable energy | Barriers to Renewable energy | Successful Business Models/Strategies | What should be the WB Role in assisting RE scale-up | Suggested Content for the Handbook |
| WIND ENERGY SYSTEMS | | | | | | |
| <p><i>Simon Mwacharo Guyo</i></p> <p>Director, Craftskills Enterprises, P.O. Box 57357 00200 Nairobi.</p> <p>Windcruiser@craftskills.com</p> <p>http://www.craftskills.com</p> | <p>Specialize in wind power. Manufacturer and sale Wind power generators, wind-solar hybrid systems</p> | <p>Based in Kibera and has made and installed wind generators for households electricity in Ngong, Ongata Rongai, Marsabit, Nakuru and parts of Taita. The business is picking up and is expected to serve other parts of the country. The company was also featured in the Horizon Magazine of Daily Nation, 16th September 2004.</p> | <ul style="list-style-type: none"> • Lack of funding from local banks for small-scale entrepreneurs. The banks have strict requirements to qualify for the loans • Lack of education on the maintenance of renewable energy systems to the local citizens • High prices pegged on the renewable energy, thus equipment are unaffordable to most people • Lack of or bad government policy on alternative energy installations at per with the national grid | <ul style="list-style-type: none"> • Availability of renewable energy equipment to small business people, especially in rural areas • Demonstration sites for the renewable energy in rural areas to counter the stigma on renewable energy and previous failures • Price reduction by reducing the middleman effect on renewable energy • Encourage hiring, leasing and acquisition of equipment through hire purchase | <ul style="list-style-type: none"> • By educating the public to create awareness about available funding and procedures expected for such a funding • By setting up pilot projects e.g. in schools, hospitals, market centers etc for people to witness • By funding more in research on renewable energy with the goal of making renewable affordable to the masses | <ul style="list-style-type: none"> • System sizing and scaling for different categories of renewable energy applications • The handbook should address examples of successful renewable energy applications, photos and places |
| <p>David N Mburu Assistant Technical Manager Kenital (K) limited Ngong Rd, P.O. Box 55517, Nairobi, Kenya Tel/Fax: 2715960, 2713487, 2718959, 2719603, 2725269,</p> | <p>Specialists in Solar energy equipment and wind systems,</p> | | <ul style="list-style-type: none"> • Renewable energy technologies are not advanced • Equipment are too costly and there is no financing • Lack of trained manpower in some areas, are too far and not well | <ul style="list-style-type: none"> • Training • Advertising • Seminars, forums, exhibitions, trade fares etc • Creation of purchasing power-through loans, hire purchase, check off | <ul style="list-style-type: none"> • Promote local manufacturing • Zero rating renewable energy equipment | <ul style="list-style-type: none"> • Levels of technology • Basic training • Dealership-organisations dealing with renewable energy |

| Kenya Individual Respondent Detail | | | | | | |
|--|---|---|--|--|--|---|
| Name and address | Type of institution and area of specialization | Future plans to expand renewable energy | Barriers to Renewable energy | Successful Business Models/Strategies | What should be the WB Role in assisting RE scale-up | Suggested Content for the Handbook |
| 2723600 Email: info@kenital.com | | | trained | systems etc | | |
| SOLAR ENERGY COMPANIES | | | | | | |
| John R.S. Rostom Solar Engineer Davis & Shirliff Ltd P.O. Box | Dealers in water related equipment. They are also involved in the sales of solar power equipments | Want to move into solar water heating business in future. | <ul style="list-style-type: none"> • Lack of public education on availability, usage and importance of renewable energy technology • Lack of vigorous advertising and awareness by government bodies and the private sector • Current imposition of import duty and value added tax on most solar equipment and accessories | <ul style="list-style-type: none"> • The need for more solar exhibitions and symposiums • Introduction of solar technology awareness in academic curriculums, and training institutes • Use of saccoes to promote installation and usage of solar home lighting systems | <ul style="list-style-type: none"> • Target more viable projects that the country is desperately in need of such as solar water pumping • Generally to invest more money into grants that will ensure sustainable development in rural diversification projects which benefit communities as well as being economically viable | <ul style="list-style-type: none"> • General basic theories on renewable energy technologies • Technical sizing guidelines • Availability of various solar components in the country • List of solar companies and NGOs for reference and sample purposes • Economic viability of renewable energy usage vis-a vis other forms of power generation |
| Eric Muhanji Managing director Solagen Limited P .O. Box 45679, Nairobi, Kenya Tel: 441160/1 Fax: 444182 Email: info@solagen.com Website: www.solagen.com | Dealers in solar energy equipment | | <ul style="list-style-type: none"> • Availability of credit • Lack of standards • Lack of training • Lack of government support | <ul style="list-style-type: none"> • Government support | Pressurize government to consider for renewable energy portfolio in its energy mix | - |
| MICRO-HYDROPOWER SYSTEMS | | | | | | |

| Kenya Individual Respondent Detail | | | | | | |
|---|---|--|---|--|---|---|
| Name and address | Type of institution and area of specialization | Future plans to expand renewable energy | Barriers to Renewable energy | Successful Business Models/Strategies | What should be the WB Role in assisting RE scale-up | Suggested Content for the Handbook |
| Charles Nyagilo Projects Engineer Philafe Engineering Limited | Specialize in electrical engineering for solar systems, wind and micro hydropower systems | | <ul style="list-style-type: none"> Lack of awareness and limited information Expensive technology that is unaffordable to most people | <ul style="list-style-type: none"> Proper establishment of dealership with qualified field personnel Exhibitions and promotion of the products Introduction of affordable and effective or practical alternatives | <ul style="list-style-type: none"> Introducing successful models from other parts of the world Introducing some of the information to schools and other institutions around the country | <ul style="list-style-type: none"> Make the information and technology available to those interested Hand book will help by pass some middle men with incomplete information, help reduce misinformation Very useful to students and enthusiasts |
| GENSETS | | | | | | |
| Maurice Mulinge Sales Engineer Rift Valley Machinery Services | Specialize in Generators, water pumps, solar equipment | Aspire to be a leader in Renewable Energy Technologies | <ul style="list-style-type: none"> Lack of training personnel – trainers of trainers has to be carried out; selection should given a keen End-user have not been enlightened on the use of renewables Lack or little interest from the governments departments to support use of renewables Technicians in the field are not competent, resulting to poor installations (sizing and advice to the final consumer) | <ul style="list-style-type: none"> Renewables should be introduced to people through exhibitions, trade shows, company journals and other newsletters Seminars for the companies dealing in renewables should be introduced Competitive pricing on renewables should be considered, e.g. Consider tax free importation for the products | <ul style="list-style-type: none"> Support or train the few renewable energy specialists with have to cope with the current situation, especially in the field on the installation and after sales service Fund/ supplement some of the renewable we are currently running in the country | <ul style="list-style-type: none"> Cost savings on the organisations who are on renewables Various designs for different types of RETs by outlining all advantages and disadvantages of each. Expected support from implementers |
| Jinal B. Singh Marketing Imico Co. Ltd | Specialize in selling generators. | Aspire to go into solar energy business soon | <ul style="list-style-type: none"> Prices of most equipment are exorbitant Lack of awareness | <ul style="list-style-type: none"> Organizing exhibitions, trade fares Training of | <ul style="list-style-type: none"> Funding of projects that put in use renewable energy e.g. solar PVs, small | |

| Kenya Individual Respondent Detail | | | | | | |
|--|--|--|---|---|---|--|
| Name and address | Type of institution and area of specialization | Future plans to expand renewable energy | Barriers to Renewable energy | Successful Business Models/Strategies | What should be the WB Role in assisting RE scale-up | Suggested Content for the Handbook |
| | | | | technicians on how to use various renewable energy or gensets <ul style="list-style-type: none"> • Offering loans or credit for the purchase of these equipments • Provide advisory services to groups buying the equipment for use | hydros <ul style="list-style-type: none"> • Funding training programmes at community levels in areas of renewable energy | |
| Noah Odhiambo Ombogo Technical Manager Electrocom Systems Services Ltd. P.O. Box 49329, Nairobi | Specialize in the installation of generators and construction of power lines –11 kv and 33kv | | | <ul style="list-style-type: none"> • Proper publicity • Use of exhibitions • Also organizing educative seminars | <ul style="list-style-type: none"> • Funding renewable energy projects • Funding of training of technicians | |
| FINANCING INSTITUTIONS | | | | | | |
| Edward Mudibo Managing Director KUSCCO Ltd | KUSCCO is an umbrella body of all sacco in the country. Besides offering sacco products to their members, they provide consumer financing to their member to purchase LPG equipments and Solar PV. | KUSCCO partner with relevant energy businesses in offering energy technical options to its members and recover the money through check off system. So far the most successful model. | <ul style="list-style-type: none"> • Renewable energy systems such as solar are capital intensive • Getting installers who can maintain renewable energy equipment due to low level of training of technicians. • The equipments also have to be right standards. The World Bank has helped them identify the right specifications and standards in the PVMTI initiative. • Failure of equipment to perform to the requirements • The procedures followed by IFC in processing loan application to beneficiary | <ul style="list-style-type: none"> • Institutions that provide enterprise and consumer financing for renewable energy systems should have risk management programmes • While dealing with SACCOs, renewable energy providers should not target members directly but do so through intermediaries institutions that will help them recover | <ul style="list-style-type: none"> • Need to vet products to ensure quality, otherwise poor products will increase failure rates of financing schemes • The need for education to sacco members to use products correctly and effectively • International financing organisations such as World Bank should use reputable institutions with a good track record in | <ul style="list-style-type: none"> • The handbook should make members understand business models and a portfolio of energy equipment • Should address quality and what should people be looking for while purchasing such equipment • Uses of renewable energy systems, e.g. up to what levels and wattage. The consumers need to know other uses of the systems, e.g. opportunities for employment, income generation potential etc. |

| Kenya Individual Respondent Detail | | | | | | |
|---|---|--|---|---|--|---|
| Name and address | Type of institution and area of specialization | Future plans to expand renewable energy | Barriers to Renewable energy | Successful Business Models/Strategies | What should be the WB Role in assisting RE scale-up | Suggested Content for the Handbook |
| | | | institutions to invest in renewable energy systems takes a long time, thus leading to delay of implementing RE programmes | <p>the loans e.g. through check off systems. Though the level of intermediary institutions should also be reduced to enhance cheaper loans and minimize delays in approval of loans.</p> <ul style="list-style-type: none"> Partnership with energy businesses is good to help bring down the costs of transactions making renewable energy cheaper. | <p>RE.</p> <ul style="list-style-type: none"> Provision of affordable credit for renewable energy development Funding for education to members for capacity building Help in dissemination of standard energy products | <ul style="list-style-type: none"> Kinds of institutions financing renewable energy systems and development worldwide, in sub-Sahara and specifically Kenya How to maintain various renewable energy systems, e.g. what customers need to do, trouble shooting etc The handbook should provide a menu of all renewable energy systems, all possible sources, their merits and demerits vis-a vis other conventional energy systems. This will help consumers as they make informed choices. Address various skill needs of renewable energy systems |
| Fidelis Kimonyi Deputy Chief Operations manager, K-REP Development Agency | Have financed renewable energy systems such as solar equipment through saccos in Bungoma. | The solar programme so far failed. He shared the lessons learnt and how to scale RETs. | <ul style="list-style-type: none"> Remoteness of potential clients due to poor infrastructure Recovery of money from clients who have taken solar systems on loans, for instance the solar programme in Bungoma failed since the Teacher Service Commission to provide the code for the check off system Lack of technical support on the ground to ensure effective installation of | <ul style="list-style-type: none"> Promoters of renewable energy systems should consider use of check off systems for clients on regular income. They should also design financing programmes that target clients not on regular incomes e.g. through subsidies, soften terms etc, Group lending | <ul style="list-style-type: none"> The worldbank should carry out piloting phases to demonstrate various renewable energy systems. The pilot phase has to be participatory as possible with the target groups. Use Micro-Financing institutions that lend to low income people | <ul style="list-style-type: none"> The handbook should summarize renewable energy systems in general How to access renewable energy to both enterprenours and end users How to get the qualified people to do renewable energy. Ened users should know the right technical people Where to train and how |

| Kenya Individual Respondent Detail | | | | | | |
|--|---|--|--|---|---|---|
| Name and address | Type of institution and area of specialization | Future plans to expand renewable energy | Barriers to Renewable energy | Successful Business Models/Strategies | What should be the WB Role in assisting RE scale-up | Suggested Content for the Handbook |
| | | | <ul style="list-style-type: none"> equipment and maintenance The solar programme failed because it did not have a supplier of solar equipment and after sales support Failure of solar equipment The problem of accessing solar equipment to clients who have no regular income Energy systems do not generate income for clients, thus do not pay for itself.. | <ul style="list-style-type: none"> methodology (self selecting of individuals to address the collateral and select reliable clients to benefit. Need to integrate training of system with financing and technical support | | |
| GEOHERMAL ENERGY COMPANIES | | | | | | |
| <p>Dr. Silas M. Simiyu Geothermal Development Manager Olkaria geothermal, KENGEN P.O. Box 785, Naivasha Tel. 254 –05020 21359/605, 5037-9 Ssimiyu@kengen.co.ke</p> | Geothermal development | | <ul style="list-style-type: none"> Geothermal equipment are too costly and there is limited finance There is lack of high level expertise to develop and utilize the equipment There is lack of equipment There are no appropriate policies to govern geothermal development | <ul style="list-style-type: none"> Private public sector partnership models – increase public awareness of potential renewable energy, public education, introduction into school curriculum and courses at university, collaboration with KenGen; educate politicians and legislators to understand importance of renewable; sponsor conferences, public fora where energy issues are discussed | <ul style="list-style-type: none"> Mobilization of finance Support for training Technology transfer programmes Support for collaboration research programmes that are focused on the local energy need situations Support in the development of appropriate technology commensurate with the national energy needs Strengthening the local capacity on project management | <ul style="list-style-type: none"> A comparative analysis of the various energy sources Guidelines, benefits and implementation procedure of the Kyoto protocol Success stories (case studies) of implemented renewable energy projects Proper project management guidelines Relationship between world bank funding and political circumstances A hand book should address a list of models and options Case studies to be included in the |

| Kenya Individual Respondent Detail | | | | | | |
|---|--|---|-------------------------------------|---------------------------------------|---|---|
| Name and address | Type of institution and area of specialization | Future plans to expand renewable energy | <i>Barriers to Renewable energy</i> | Successful Business Models/Strategies | What should be the WB Role in assisting RE scale-up | Suggested Content for the Handbook |
| | | | | | | handbook include <ul style="list-style-type: none"> • A case study of successful changeover to renewable energy stories e.g. German cases • A case study of failed projects and reasons for failure |

Tanzania Individual Respondent Detail

| Name and address | Type of institution and area of specialization | Future plans to expand renewable energy | <i>Barriers to Renewable energy</i> | Successful Business Models/Strategies | What should be the WB Role in assisting RE scale-up | Suggested Content for the Handbook |
|--|---|--|--|--|--|--|
| WIND ENERGY SYSTEMS | | | | | | |
| Estomih. N. Sawe Executive Director TaTedo | TaTedo is an NGO concerned with woodfuel stoves, solar PV, solar driers, micro-wind turbines, improved charcoal production, ovens and small hydro power. - Promotes the uptake and use of modern energy for productive and consumptive needs | Plan to carry out capacity development in provision of off-grid electricity from renewable energy sources. | <ul style="list-style-type: none"> • Policy framework that lacks implementation capacity, inadequate legal and regulatory framework, lack of strategy and clear programme • Financial limitations, limited financing schemes i.e. grants, credits, low | <ul style="list-style-type: none"> • Local level data base acquisition, participatory needs and priorities assessment. • Demonstrations, awareness raising and technologies adaptation | <ul style="list-style-type: none"> • Support development and implementation of appropriate macro-policies, legal and regulatory framework, strategies and programmes • Support local | <ul style="list-style-type: none"> • Proven framework on design and implementation • Critical factors for success • Criteria for selecting/prioritising areas for introducing specific RE |

| Name and address | Type of institution and area of specialization | Future plans to expand renewable energy | <i>Barriers to Renewable energy</i> | Successful Business Models/Strategies | What should be the WB Role in assisting RE scale-up | Suggested Content for the Handbook |
|------------------|---|---|---|---|--|--|
| | <p>for households, SMEs and institutions and agro-processing. This is done through implementation of programmes and projects.</p> <p>- Also involved in RE enterprise support and Applied research.</p> | | <p>affordability.</p> <ul style="list-style-type: none"> • Technical constraints i.e. inadequate knowledge, skills, prevalence of low quality technologies, limited local production, and limited reliable data. • Social and cultural limitations: low understanding of local situations, RE needs and development is area specific, low level of awareness at local levels. | <ul style="list-style-type: none"> • Capacity building for dissemination, entrepreneurship, market development and institutional development • Close monitoring, evaluation, learning and replication | <p>capacity building of individuals, and institutions that would enhance greater macro and micro participation at all stages of RE development.</p> <ul style="list-style-type: none"> • Support efforts to overcome initial high costs of RE technologies i.e. credit schemes, tax and pricing incentives that should promote local markets and promote inexpensive but improved RE technology products. • Assist adaptation and scale up of technologies and best practices that | <p>technologies</p> <ul style="list-style-type: none"> • Roles of key stakeholders, • Basic standards and major financing facilities and donors. |

| Name and address | Type of institution and area of specialization | Future plans to expand renewable energy | <i>Barriers to Renewable energy</i> | Successful Business Models/Strategies | What should be the WB Role in assisting RE scale-up | Suggested Content for the Handbook |
|---|--|---|---|--|--|---|
| | | | | | <p>have worked elsewhere in the world.</p> <ul style="list-style-type: none"> Use existing local capacities and experiences where available the Bank may not know everything especially at local level. | |
| SOLAR ENERGY COMPANIES | | | | | | |
| Francis Kibbisa Managing Director Rex Investments ltd | PV Solar Energy | Mass rural electrification through branches | <ul style="list-style-type: none"> Lack of awareness of technologies by the public Unaffordable initial cost of equipment Low per capita income of people to whom the technologies are aimed at Taxation on | <ul style="list-style-type: none"> Advocacy for tax-free renewable energy equipment which would make the equipment cheaper. Accessibility of small-scale credit facilities through micro finance | <ul style="list-style-type: none"> Support client countries to produce renewable energy equipment locally so that the cost of importation and the procurement logistics is minimised. Should subsidise | <ul style="list-style-type: none"> World Bank Standards of equipment / renewable energy generally. Proper design procedures and a simple illustration of relevant software for equipment design. Project management of |

| Name and address | Type of institution and area of specialization | Future plans to expand renewable energy | <i>Barriers to Renewable energy</i> | Successful Business Models/Strategies | What should be the WB Role in assisting RE scale-up | Suggested Content for the Handbook |
|------------------|--|---|-------------------------------------|--|--|--|
| | | | renewable energy equipment | <p>institutions to the low-income earners that will increase their purchasing power.</p> <ul style="list-style-type: none"> • Mass sensitisation on the use of renewable energy through demonstrations and training in a way people will get to know the importance of this technology and its impact on society and environment. | <p>renewable energy industries/companies such that they can cope with the costs of manufacturing, marketing and selling to the end-user cheaply, since its an important technology to the rural areas of third world countries.</p> <ul style="list-style-type: none"> • Provision of handbooks and training kits to specialised renewable energy companies will improve the quality of services offered to clients and thus prolong the system's life cycle. | <p>renewable energy;</p> <ul style="list-style-type: none"> • Safety precautions while on site; • How to prevent theft of installed equipment. |

| Name and address | Type of institution and area of specialization | Future plans to expand renewable energy | <i>Barriers to Renewable energy</i> | Successful Business Models/Strategies | What should be the WB Role in assisting RE scale-up | Suggested Content for the Handbook |
|--|---|---|--|---|---|--|
| | | | | | <ul style="list-style-type: none"> • Mass sensitisation in the rural areas of client countries shall increase awareness on the use of systems and this will have a positive impact on society/client countries. • Fund and/or identify key sectors of the economy in order to increase use of renewable energy in off-grid areas. | |
| Mr. Howard Eaton Executive Director Solar Electric 2000 Company | It is a private energy company dealing in solar PV installation, sales and training | Awareness Projects, Training, Expanding Markets Opportunities in Tanzania | <ul style="list-style-type: none"> • Financing arrangements to enable end users afford RE technologies • Awareness | <ul style="list-style-type: none"> • Proper training for sales personnel • Supplying useful | <ul style="list-style-type: none"> • Advertising RE (including Solar PV) best practices from developing countries like China, India, | <ul style="list-style-type: none"> • System sizing of renewable energy systems • Battery maintenance of renewable energy |

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|---|--|---|--|---|---|---|
| | | | especially to rural areas <ul style="list-style-type: none"> • Training/Capacity building in the Renewable Energy • Business development and management including salesmanship in Renewable Energy | products such as phone chargers, cold coolers etc. <ul style="list-style-type: none"> • Rental solar home systems • Introduction of home solar systems with payment plans | etc. <ul style="list-style-type: none"> • Advertising the cost effectiveness of investing in complete solar home systems including the long run (5-10 years) benefits • Promoting small-scale renewable energy companies who have better contacts with targeted (rural) communities | systems <ul style="list-style-type: none"> • Rational use (efficiency) of renewable energy systems • Simple renewable energy systems' operation and maintenance procedures • Overall advantages of renewable energy systems including solar PV use |
| <i>COGENERATION</i> | | | | | | |
| Omari Athumani Chief Engineer Tanganyika Wattle Company | Electric power generation using forest products (biomass cogeneration plant) | 15 MW wood-fired power station | <ul style="list-style-type: none"> • Funding to increase generation capacity • Tariff levels | Tanwat cogeneration plant | <ul style="list-style-type: none"> • Through the proposed Rural Energy Agency under the Ministry of | <ul style="list-style-type: none"> • Instruction manuals • Good practise on safety and health |

| Name and address | Type of institution and area of specialization | Future plans to expand renewable energy | <i>Barriers to Renewable energy</i> | Successful Business Models/Strategies | What should be the WB Role in assisting RE scale-up | Suggested Content for the Handbook |
|--|---|---|--|---|---|---|
| | | | <ul style="list-style-type: none"> Customer demand (uncertainty over Makambako interconnection to the national grid) | | Energy and Minerals | (S&H) |
| Bernard J. D. Kihula Factory Manager Mtibwa Sugar Estates Ltd. | Private cane growing and sugar production company. Also generate electricity from bagasse | Co7777generate electricity for export to the grid | <ul style="list-style-type: none"> The factory operations are seasonal, ie. 6-8 months per year and this is the only period when cogeneration activities can take place. Power purchase agreements with TANESCO The 100km line from Morogoro to Mtibwa has to be up-graded if for high scale cogeneration to take place | <ul style="list-style-type: none"> Incentives for clean power producers Motivating power purchase agreements Government should support efforts by the private sector on cogeneration activities. | <ul style="list-style-type: none"> Assist in acquiring appropriate technologies for efficient power generation. Subsidise the purchase of power cogeneration equipment. Training of local staff. Assist in the planning and designing of appropriate power cogeneration plants. | <ul style="list-style-type: none"> Renewable resources Renewable energy business development Policy and planning Rural energy development |
| FINANCING INSTITUTIONS | | | | | | |

| Name and address | Type of institution and area of specialization | Future plans to expand renewable energy | <i>Barriers to Renewable energy</i> | Successful Business Models/Strategies | What should be the WB Role in assisting RE scale-up | Suggested Content for the Handbook |
|---|---|---|--|--|---|--|
| Peter Temu Mashinga Planning and Research Manager Savings and Credit Cooperative Union League of Tanzania (SCCULT) 1992 Ltd | SCCULT (1992) Ltd is a cooperative micro-finance institution that provides loans for RE products. | Work with RE's service providers | <ul style="list-style-type: none"> • Lack of financing avenues for procurement of RE products and services. • Lack of awareness on RE opportunities available • Non-involvement of the private sector in RE development • Inappropriate dissemination of RE technologies to the public particularly in rural areas | <ul style="list-style-type: none"> • Synchronize financing arrangements with RE development • Encourage private sector participation • Include RE in poverty interventions/strategies. • Include RE in environmental council activities and policies | <ul style="list-style-type: none"> • Support community initiatives in dealing with RE development • Strengthen community micro-finance initiatives in collaboration with national, association programmes • Support awareness campaigns for promoting RE • Support training with respect to RE at community level | <ul style="list-style-type: none"> • Information on RE technologies • Directory on RE providers • Simple RE pictorial RE technology applications • RE training |
| Anderson Mlabwa Director of Credit Cooperative and Rural Development Bank (CRDB) Ltd | Financial Institution | Lending to those who need loan capital for renewable energy investments | <ul style="list-style-type: none"> • Lack of capital to invest in renewable energy • Inadequate information to lenders on the | <ul style="list-style-type: none"> • A development fund should be established by the Government or Donor Agencies, | <ul style="list-style-type: none"> • Provide either a guarantee fund to lenders in this area or soft loans to investors | <ul style="list-style-type: none"> • Simple instructions on how to operate the equipment • Advantages of renewable energy |

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| | | | <p>viability of such a business given that within the banking sector end users (mainly rural population) are economically poor to pay for the services at a rate which can pay for all bank costs and leave some profit.</p> <ul style="list-style-type: none"> • Lack of loans investments due to long-term nature of the payback period. Most of the banks in Tanzania are commercial banks that mobilize short-term funds and therefore cannot afford to provide long-term loans for investments. • Inadequate information of the existence of such technologies to the end-users. | <p>which can be accessed by investors through bank in a form of a loan. Alternatively this can be in form of a guarantee fund that can be accessed by banks as protection against the risk non-repayment of loans.</p> <ul style="list-style-type: none"> • Workshops/seminars/forums should be conducted to lenders and investors to clear some of their worries. | <ul style="list-style-type: none"> • Facilitate awareness training to investors, lenders and consumers on the viability of renewable energy. | <p>(economic, social, environmental) over the alternatives they are using currently.</p> |

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|---|---|---|--|--|--|---|
| GEOTHERMAL ENERGY | | | | | | |
| George Kibakaya Director First Energy Company Ltd | It is a private energy company concerned with GEOTECH (Earth Science) or Geothermal Exploration | Geothermal Power Generation | <ul style="list-style-type: none"> • Availability of risk fund on steam field development • Availability of cheap investment facilities such as grants or low interest rate on development capital funds | <p>Introduce subsidy/grant for steam field development and cheap capital for project development and as a result:</p> <p>a) The project pay back period will be reduced</p> <p>b) Geothermal project will be competitive with other alternative source of energy such as natural gas</p> <p>c) The final electricity tariff to the consumer will</p> | <p>Introduce incentive for participation of private entrepreneurs by:</p> <p>a) Assisting in overcoming barriers through introduction of risk funds in the exploration stage.</p> <p>b) Availability of cheap capital for project development in the initial project stages</p> <p>c) Introduction /availability of infrastructure facilities' funds especially for the rural electrification. This is very important in</p> | <ul style="list-style-type: none"> • Steam field development operational manuals on i) Drilling, ii.) Surface facilities and iii) safety • Corrosion prevention • Silica control and management • Non-compressible gas management |

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| | | | | low and hence more energy use. | meeting project sponsor obligations in the early stages of the project d) Assisting in the infrastructure development eg. funding construction of mini-grids in rural areas as well as interconnection of the generation units to the main grid. | |

Appendix 4

List of Existing Toolkits on Renewable Energy

| | Renewable Energy | Title | Date | Sponsor/Author | Category |
|----|------------------|---|--------|--|----------------------|
| 1 | General | Appropriate Household Energy Technology Development-Training manual | 1999 | ITDG | Training manual |
| 2 | General | Electricity in Households and Microenterprises | 2001 | ITDG | Training manual |
| 3 | General | Corporate Guide to Green Power Markets (Installment 5): Renewable energy certificates: An attractive means for corporate customers to purchase renewable energy | 2003 | World Resources Institute | Training manual |
| 4 | General | Corporate Guide to Green Power Markets (Installment 4): Introducing the Green Power Analysis Tool | 2003 | World Resources Institute | Training manual |
| 5 | General | Corporate Guide to Green Power Markets (Installment 3): Corporate greenhouse gas emissions inventories: Accounting for the climate benefits of green power | 2003 | World Resources Institute | Training manual |
| 6 | General | Corporate Guide to Green Power Markets (Installment 2): Opportunities with landfill gas | 2003 | World Resources Institute | Training manual |
| 7 | General | Corporate Guide to Green Power Markets (Installment 1): Business case, challenges, and steps forward | 2003 | World Resources Institute | Training manual |
| 8 | General | Renewable Energy for Rural Infrastructure Development | Sep-01 | World Bank & Intermediate Technology Consultants (ITC), Ltd. | Theoretical analysis |
| 9 | General | Implementing the Framework Convention on Climate Change: Incremental Costs and the Role of the GEF | 1993 | GEF | Theoretical analysis |
| 10 | General | Promoting Energy Efficiency and Renewable Energy: GEF Climate Change Projects and Impacts | 2000 | GEF | Theoretical analysis |

| | | | | | |
|----|---------|---|--------|---|----------------------|
| 11 | General | Renewable Energy for Sustainable Development and Climate Protection | 1999 | German Federal Ministry for Economic Cooperation and Development (BMZ) | Theoretical analysis |
| 12 | General | Electricity, Renewables, and Climate Change: Searching for a Cost-Effective Policy | May-04 | Resources for the Future | Theoretical analysis |
| 13 | General | Grid-based renewable energy in developing countries: policies, strategies, and lessons from the GEF | 2002 | Eric Martinot, et al | Theoretical analysis |
| 14 | General | Reducing the Cost of Grid Extension for Rural Electrification | Feb-00 | ESMAP 227/00 | Theoretical analysis |
| 15 | General | Renewable energy markets in developing countries | 2002 | Eric Martinot, et al | Theoretical analysis |
| 16 | General | Global renewable energy markets and policies | 2004 | Eric Martinot, et al | Theoretical analysis |
| 17 | General | Renewable Energy Policies and Market Developments | 2003 | REMAC 2000 | Theoretical analysis |
| 18 | General | Renewable energy policies and barriers | 2004 | Eric Martinot, et al | Theoretical analysis |
| 19 | General | Measuring the Contribution to the Economy of Investments in Renewable Energy: Estimates of Future Consumer Gains | Feb-02 | Resources for the Future | Theoretical analysis |
| 20 | General | Renewable Energies - Innovation for the future | May-04 | German Federal Ministry for the Environment, Nature Conservation and Nuclear Safety (BMU) -Brochure | Theoretical analysis |
| 21 | General | Clean Development Mechanism and Joint Implementation-New Instruments for Financing Renewable Energy Technologies | Jan-04 | Perspectives Climate Change and Hamburg Institute of International Economics | Theoretical analysis |
| 22 | General | Mobilising Finance For Renewable Energies | Jan-04 | Basel Agency for Sustainable Energy | Theoretical analysis |
| 23 | General | Clean Energy for Development and Economic Growth: Biomass and other renewable energy options to meet energy and development needs in poor nations | 2002 | UNDP | Theoretical analysis |

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|----|---------|---|--------|--|------------------------|
| 24 | General | Renewable Energy... into the Mainstream | 2003 | IEA | Theoretical analysis |
| 25 | General | Renewables Information 2003 | 2003 | IEA | Theoretical analysis |
| 26 | General | Renewable energy technologies | 1994 | World Bank | Theoretical analysis |
| 27 | General | The world of renewable energy: wind energy, solarly energy, hydraulic power, bio energy, geo energy | 2004 | IWR, web-based | Theoretical analysis |
| 28 | General | Capacity Development, Education & Training- Integrated and sustained action is the key | Jan-04 | Global Network on Energy for Sustainable Development | Theoretical analysis |
| 29 | General | Green fees: How a tax shift can work for the environment and the economy | 1992 | World Resources Institute | Theoretical analysis |
| 30 | General | Guide to Decentralized Energy Technologies | Dec-03 | WADE | Technical handbook |
| 31 | General | The Power Guide: An international catalogue of small-scale energy equipment | 1994 | ITDG | Technical handbook |
| 32 | General | Mini-Grid Design Manual | Sep-00 | 007/00 | Technical handbook |
| 33 | General | Energy Options: An introduction to small-scale renewable energy technologies | 2002 | ITDG | Technical handbook |
| 34 | General | People Approach: A guide to participatory household energy needs assessment | 1999 | ITDG | Step-by-step guideline |
| 35 | General | PRSP Sourcebook Energy Chapter | | World Bank | Step-by-step guideline |
| 36 | General | Stakeholder Involvement in Options Assessment: Promoting Dialogue in Meeting Water and Energy Needs: A Sourcebook | Jul-03 | ESMAP 264/03 | Step-by-step guideline |
| 37 | General | Reference Guide on Climate Change & Rural Energy | 2003 | SNV, CD-ROM, web based | Step-by-step guideline |
| 38 | General | Household energy handbook : an interim guide and reference manual Vol. 1 (English) | Jul-87 | World Bank WTP67 | Step-by-step guideline |
| 39 | General | Financing Renewable Energy Projects A guide for development workers | 1997 | ITDG | Step-by-step guideline |
| 40 | General | Consulting Communities: A renewable energy toolkit | 2001 | Awel Aman Tawe | Step-by-step guideline |
| 41 | General | Renewable Energy Tool Kit | | Slippery Rock University of Pennsylvania | Step-by-step guideline |
| 42 | General | Renewable Energy for Rural Schools | Nov-00 | USAID | Step-by-step guideline |

| | | | | | |
|----|---------|---|--------|--|-----------------------------|
| 43 | General | Monitoring and Evaluation of Market Development in World Bank/GEF Climate-Change Projects: Framework and Guidelines | 1998 | Eric Martinot, et al | Step-by-step guideline |
| 44 | General | Best Practice Manual: Promoting Decentralized Electrification Investment | Oct-01 | 248/01 | Best Practice/ case studies |
| 45 | General | Household Energy Use in Developing Countries: A Multicountry Study | Oct-03 | 042/03 | Best Practice/ case studies |
| 46 | General | Best practices guide : integrated resource planning for electricity | Jun-00 | USAID, Tellus Institute | Best Practice/ case studies |
| 47 | General | Implementation of Renewable Energy Technologies: Project Opportunities and Barriers, Summary of Country Studies | 2002 | UNEP Risoe Centre on Energy, Climate and Sustainable Development (URC) | Best Practice/ case studies |
| 48 | General | National Policy Instruments: Policy Lessons for the Advancement & Diffusion of Renewable Energy Technologies Around the World | Jan-04 | Worldwatch Institute | Best Practice/ case studies |
| 49 | General | Renewable Energy on Small Islands | Aug-00 | Forum for Energy and Development (FED) | Best Practice/ case studies |
| 50 | Wind | A global strategy for wind energy | 2002 | WWEA | Theoretical analysis |
| 51 | Wind | Renewable sources of energy, with special emphasis on wind energy | 1998 | | Theoretical analysis |
| 52 | Wind | Wind pumping : a handbook Vol. 1 (English) | Jul-89 | World Bank WTP101 | Technical handbook |
| 53 | Wind | Windpumps: A guide for development workers | 2003 | ITDG | Technical handbook |
| 54 | Wind | Small Wind Systems for Rural Energy Services | 2003 | ITDG | Step-by-step guideline |
| 55 | Wind | Wind Power Projects in the CDM: Methodologies and Tools for Baselines, Carbon Financing and Sustainability Analysis | 2002 | UNEP Risoe Centre on Energy, Climate and Sustainable Development (URC) | Step-by-step guideline |
| 56 | Wind | Guidelines for assessing wind energy potential Vol. 1 (English) | Sep-91 | World Bank 11333 | Step-by-step guideline |
| 57 | Solar | Photovoltaic Applications in Rural Areas of the Developing World | Nov-00 | ESMAP 009/00 | Theoretical analysis |
| 58 | Solar | Photo-voltaic applications in rural areas of the developing world | 1995 | World Bank | Theoretical analysis |

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|----|-------|---|--------|---|-----------------------------|
| 59 | Solar | Global Lighting Services for the Poor Phase II: Text Marketing of Small "Solar" Batteries for Rural Electrification Purposes | Aug-99 | ESMAP 220/99 | Technical handbook |
| 60 | Solar | New Prospects in Solar Cooking-The GTZ Solar Cooker manual | Nov-95 | GTZ | Technical handbook |
| 61 | Solar | Solar Heating in Cold Regions: A technical guide to developing country applications | 1996 | ITDG | Technical handbook |
| 62 | Solar | Best Practices for Photovoltaic Household Electrification Programs | 1996 | World Bank | Best Practice/ case studies |
| 63 | Solar | World Bank/GEF solar home system projects: experiences and lessons learned 1993-2000 | 2001 | Eric Martinot, et al | Best Practice/ case studies |
| 64 | Solar | World Bank solar home system projects: experiences and lessons learned 1993-2000 | 2000 | Eric Martinot, et al | Best Practice/ case studies |
| 65 | Solar | The GEF Solar PV Portfolio: Emerging Experience and Lessons | 2000 | Eric Martinot, et al | Best Practice/ case studies |
| 66 | Solar | Experience with PV systems in Africa | 2001 | Risø National Laboratory | Best Practice/ case studies |
| 67 | Hydro | The Role of the Private Sector in the Small-Scale Hydropower Field | 1995 | SKAT, Swiss Centre for Development Cooperation in Technology and Management | Theoretical analysis |
| 68 | Hydro | Micro-Hydro Design Manual: A guide to small-scale water power schemes | 2002 | ITDG | Technical handbook |
| 69 | Hydro | Motors as Generators for Micro-Hydro Power | 2003 | ITDG | Technical handbook |
| 70 | Hydro | The Micro-hydro Pelton Turbine Manual "Design, manufacture and installation for small-scale hydropower" | 2000 | ITDG | Technical handbook |
| 71 | Hydro | Evaluating electrification experience : a guide to the social evaluation of small hydroelectric units in lesser developed countries | 1982 | USAID | Step-by-step guideline |
| 72 | Hydro | Guidelines for attracting developers of hydropower independent power projects Vol. 1 (English) | Apr-96 | World Bank 17625 | Step-by-step guideline |
| 73 | Hydro | Best Practices for Sustainable Development of Micro Hydro Power in Developing Countries | Aug-00 | ESMAP 006/00 | Best Practice/ case studies |
| 74 | Hydro | Local Experience With Micro-Hydro Technology | 1985 | SKAT, Swiss Centre for Development Cooperation in Technology and Management | Best Practice/ case studies |

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|----|---------|---|--------|---|---------------------------|
| 75 | Biomass | Traditional Biomass Energy: Improving its Use and Moving to Modern Energy Use | Jan-04 | African Energy Policy Research Network, et al | Theoretical analysis |
| 76 | Biomass | Small-scale biomass gasifiers for heat and power : a global review Vol. 1 (English) 1995/10/31 WTP296 Publication Order | Oct-95 | World Bank WTP296 | Technical handbook |
| 77 | Biomass | Bioenergy Primer: Modernised Biomass Energy for Sustainable Development | 2000 | UNDP | Step-by-step guideline |
| 78 | Biogas | Running a Biogas Programme: A handbook | 1988 | ITDG | Step-by-step guideline |
| 79 | Bagasse | Identifying the basic conditions for economic generation of public electricity from surplus bagasse in sugar mills Vol. 1 (English) | Apr-91 | World Bank 11343 | Step-by-step guideline |

Appendix 5

List on Reviewed Toolkits on Rural Energy

| | Rural Energy | Title | Date | Sponsor/Author | Category |
|----|--------------|--|--------|--|------------------------|
| 1 | Renewable | Renewable Energy for Rural Infrastructure Development | Sep-01 | World Bank & Intermediate Technology Consultants (ITC), Ltd. | Theoretical analysis |
| 2 | Renewable | Global Lighting Services for the Poor Phase II: Text Marketing of Small "Solar" Batteries for Rural Electrification Purposes | Aug-99 | ESMAP 220/99 | Technical handbook |
| 3 | Renewable | Small Wind Systems for Rural Energy Services | 2003 | ITDG | Step-by-step guideline |
| 4 | General | Mini-Grid Design Manual | Sep-00 | ESMAP 007/00 | Technical handbook |
| 5 | General | Appropriate Household Energy Technology Development-Training manual | 1999 | ITDG | Training manual |
| 6 | General | Electricity in Households and Microenterprises | 2001 | ITDG | Training manual |
| 7 | General | Guide to Decentralized Energy Technologies | Dec-03 | WADE | Technical handbook |
| 8 | General | Rural electrification : a hard look at costs and benefits Vol. 1 of 1 (English) | May-95 | World Bank 28516 | Theoretical analysis |
| 9 | General | Subsidies and Sustainable Rural Energy Services: Can we Create Incentives Without Distorting Markets? | Dec-00 | ESMAP 010/00 | Theoretical analysis |
| 10 | General | Tariffs for rural grid electrification | | ITDG | Theoretical analysis |
| 11 | General | Development in practice - Rural energy and development | 1996 | World Bank | Theoretical analysis |
| 12 | General | The Power Guide: An international catalogue of small-scale energy equipment | 1994 | ITDG | Technical handbook |

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|----|---------|---|--------|---|------------------------------|
| 13 | General | Low-cost Electrification Affordable electricity installation for low-income households in developing countries | 1998 | ITDG | Technical handbook |
| 14 | General | People Approach: A guide to participatory household energy needs assessment | 1999 | ITDG | Step-by-step guideline |
| 15 | General | PRSP Sourcebook Energy Chapter | | World Bank | Step-by-step guideline |
| 16 | General | Reference Guide on Climate Change & Rural Energy | 2003 | SNV, CD-ROM, web based | Step-by-step guideline |
| 17 | General | Household energy handbook : an interim guide and reference manual Vol. 1 (English) | Jul-87 | World Bank WTP67 | Step-by-step guideline |
| 18 | General | Energy For Rural Livelihoods: A framework for sustainable decision making | Sep-03 | ITDG | Step-by-step guideline |
| 19 | General | Lending for electric power in Sub-Saharan Africa Vol. 1 (English) | May-96 | World Bank 15780 | Step-by-step guideline |
| 20 | General | Monitoring and Evaluation in Rural Electrification Projects: A Demand-Oriented Approach | Jul-03 | ESMAP 037/03 | Step-by-step guideline |
| 21 | General | The Energy Dimension: A practical guide to energy in rural development programmes | 1990 | ITDG | Step-by-step guideline |
| 22 | General | Village Electrification | 1992 | SKAT, Swiss Centre for Development Cooperation in Technology and Management | Step-by-step guideline |
| 23 | General | Rural Energy Services: A handbook for sustainable energy development | 1999 | ITDG | Step-by-step guideline |
| 24 | General | Expanding electricity access to remote areas: off-grid rural electrification in developing countries | 2000 | Eric Martinot, et al | Step-by-step guideline |
| 25 | General | Best Practice Manual: Promoting Decentralized Electrification Investment | Oct-01 | ESMAP 248/01 | Best practices/ case studies |
| 26 | General | Best practices guide : integrated resource planning for electricity | Jun-00 | USAID, Tellus Institute | Best practices/ case studies |
| 27 | General | Household Energy Use in Developing Countries: A Multicountry Study | Oct-03 | ESMAP 042/03 | Best practices/ case studies |
| 28 | Diesel | Guideline for diesel generating plant specification and bid evaluation Vol. 1 (English) | Sep-91 | World Bank 11335 | Step-by-step guideline |

Joint UNDP/World Bank
ENERGY SECTOR MANAGEMENT ASSISTANCE PROGRAMME (ESMAP)

LIST OF TECHNICAL PAPER SERIES

| <i>Region/Country</i> | <i>Activity/Report Title</i> | <i>Date</i> | <i>Number</i> |
|---------------------------------|---|-------------|---------------|
| SUB-SAHARAN AFRICA (AFR) | | | |
| Africa | Power Trade in Nile Basin Initiative Phase II (CD Only): <i>Part I: Minutes of the High-level Power Experts Meeting; and Part II: Minutes of the First Meeting of the Nile Basin Ministers Responsible for Electricity</i> | 04/05 | 067/05 |
| Chad | Revenue Management Seminar. Oslo, June 25-26, 2003. (CD Only) | 06/05 | 075/05 |
| Côte d'Ivoire | Workshop on Rural Energy and Sustainable Development, January 30-31, 2002. (French Only) | 04/05 | 068/05 |
| Ethiopia | Phase-Out of Leaded Gasoline in Oil Importing Countries of Sub-Saharan Africa: The Case of Ethiopia - Action Plan. | 12/03 | 038/03 |
| | Sub-Saharan Petroleum Products Transportation Corridor: Analysis And Case Studies | 03/03 | 033/03 |
| | Phase-Out of Leaded Gasoline in Sub-Saharan Africa | 04/02 | 028/02 |
| | Energy and Poverty: How can Modern Energy Services Contribute to Poverty Reduction | 03/03 | 032/03 |
| East Africa | Sub-Regional Conference on the Phase-out Leaded Gasoline in East Africa. June 5-7, 2002. | 11/03 | 044/03 |
| Kenya | Field Performance Evaluation of Amorphous Silicon (a-Si) Photovoltaic Systems in Kenya: Methods and Measurement in Support of a Sustainable Commercial Solar Energy Industry | 08/00 | 005/00 |
| | The Kenya Portable Battery Pack Experience: Test Marketing an Alternative for Low-Income Rural Household Electrification | 12/01 | 05/01 |
| Malawi | Rural Energy and Institutional Development | 04/05 | 069/05 |
| Mali | Phase-Out of Leaded Gasoline in Oil Importing Countries of Sub-Saharan Africa: The Case of Mali - Action Plan. (French) | 12/03 | 041/03 |
| Mauritania | Phase-Out of Leaded Gasoline in Oil Importing Countries of Sub-Saharan Africa: The Case of Mauritania - Action Plan. (French) | 12/03 | 040/03 |
| Nigeria | Phase-Out of Leaded Gasoline in Nigeria | 11/02 | 029/02 |
| | Nigerian LP Gas Sector Improvement Study | 03/04 | 056/04 |
| | Taxation and State Participation in Nigeria's Oil and Gas Sector | 08/04 | 057/04 |
| Regional | Second Steering Committee: The Road Ahead. Clean Air Initiative In Sub-Saharan African Cities. Paris, March 13-14, 2003. | 12/03 | 045/03 |
| | Lead Elimination from Gasoline in Sub-Saharan Africa. Sub-regional Conference of the West-Africa group. Dakar, Senegal March 26-27, 2002 (French only) | 12/03 | 046/03 |
| | 1998-2002 Progress Report. The World Bank Clean Air Initiative in Sub-Saharan African Cities. Working Paper #10 (Clean Air Initiative/ESMAP) | 02/02 | 048/04 |
| | Landfill Gas Capture Opportunity in Sub Saharan Africa | 06/05 | 074/05 |
| Senegal | Regional Conference on the Phase-Out of Leaded Gasoline in Sub-Saharan Africa | 03/02 | 022/02 |
| | Elimination du Plomb dans l'Essence en Afrique Sub-Saharienne Conference Sous Regionales du Groupe Afrique de l'Quest. Dakar, Senegal. March 26-27, 2002. | 12/03 | 046/03 |
| South Africa | South Africa Workshop: People's Power Workshop. | 12/04 | 064/04 |
| Swaziland | Solar Electrification Program 2001—2010: Phase 1: 2001—2002 (Solar Energy in the Pilot Area) | 12/01 | 019/01 |

| <i>Region/Country</i> | <i>Activity/Report Title</i> | <i>Date</i> | <i>Number</i> |
|--------------------------------------|--|-------------|---------------|
| Tanzania | Mini Hydropower Development Case Studies on the Malagarasi, Muhuwesi, and Kikuletwa Rivers Volumes I, II, and III | 04/02 | 024/02 |
| | Phase-Out of Leaded Gasoline in Oil Importing Countries of Sub-Saharan Africa: The Case of Tanzania - Action Plan. | 12/03 | 039/03 |
| Uganda | Report on the Uganda Power Sector Reform and Regulation Strategy Workshop | 08/00 | 004/00 |
| WEST AFRICA (AFR) | | | |
| Regional | Market Development | 12/01 | 017/01 |
| EAST ASIA AND PACIFIC (EAP) | | | |
| Cambodia | Efficiency Improvement for Commercialization of the Power Sector | 10/02 | 031/02 |
| China | Assessing Markets for Renewable Energy in Rural Areas of Northwestern China | 08/00 | 003/00 |
| | Technology Assessment of Clean Coal Technologies for China Volume I—Electric Power Production | 05/01 | 011/01 |
| | Technology Assessment of Clean Coal Technologies for China Volume II—Environmental and Energy Efficiency Improvements for Non-power Uses of Coal | 05/01 | 011/01 |
| | Technology Assessment of Clean Coal Technologies for China Volume III—Environmental Compliance in the Energy Sector: Methodological Approach and Least-Cost Strategies | 12/01 | 011/01 |
| Thailand | DSM in Thailand: A Case Study | 10/00 | 008/00 |
| | Development of a Regional Power Market in the Greater Mekong Sub-Region (GMS) | 12/01 | 015/01 |
| Vietnam | Options for Renewable Energy in Vietnam | 07/00 | 001/00 |
| | Renewable Energy Action Plan | 03/02 | 021/02 |
| | Vietnam's Petroleum Sector: Technical Assistance for the Revision of the Existing Legal and Regulatory Framework | 03/04 | 053/04 |
| SOUTH ASIA (SAS) | | | |
| Bangladesh | Workshop on Bangladesh Power Sector Reform | 12/01 | 018/01 |
| | Integrating Gender in Energy Provision: The Case of Bangladesh | 04/04 | 054/04 |
| | Opportunities for Women in Renewable Energy Technology Use In Bangladesh, Phase I | 04/04 | 055/04 |
| EUROPE AND CENTRAL ASIA (ECA) | | | |
| Russia | Russia Pipeline Oil Spill Study | 03/03 | 034/03 |

| <i>Region/Country</i> | <i>Activity/Report Title</i> | <i>Date</i> | <i>Number</i> |
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MIDDLE EASTERN AND NORTH AFRICA REGION (MENA)

| | | | |
|----------|--|-------|--------|
| Regional | Roundtable on Opportunities and Challenges in the Water, Sanitation And Power Sectors in the Middle East and North Africa Region. Summary Proceedings. May 26-28, 2003. Beit Mary, Lebanon. (CD) | 02/04 | 049/04 |
|----------|--|-------|--------|

LATIN AMERICA AND THE CARIBBEAN REGION (LCR)

| | | | |
|-----------|---|-------|--------|
| Brazil | Background Study for a National Rural Electrification Strategy: Aiming for Universal Access | 03/05 | 066/05 |
| Bolivia | Country Program Phase II: Rural Energy and Energy Efficiency Report on Operational Activities | 05/05 | 072/05 |
| Ecuador | Programa de Entrenamiento a Representantes de Nacionalidades Amazónicas en Temas Hidrocarbúricos | 08/02 | 025/02 |
| Guatemala | Evaluation of Improved Stove Programs: Final Report of Project Case Studies | 12/04 | 060/04 |
| Mexico | Energy Policies and the Mexican Economy | 01/04 | 047/04 |
| Nicaragua | Aid-Memoir from the Rural Electrification Workshop (Spanish only) | 03/03 | 030/04 |
| | Sustainable Charcoal Production in the Chinandega Region | 04/05 | 071/05 |
| Regional | Regional Electricity Markets Interconnections — Phase I Identification of Issues for the Development of Regional Power Markets in South America | 12/01 | 016/01 |
| | Regional Electricity Markets Interconnections — Phase II Proposals to Facilitate Increased Energy Exchanges in South America | 04/02 | 016/01 |
| | Population, Energy and Environment Program (PEA) Comparative Analysis on the Distribution of Oil Rents (English and Spanish) | 02/02 | 020/02 |
| | Estudio Comparativo sobre la Distribución de la Renta Petrolera Estudio de Casos: Bolivia, Colombia, Ecuador y Perú | 03/02 | 023/02 |
| | Latin American and Caribbean Refinery Sector Development Report – Volumes I and II | 08/02 | 026/02 |
| | The Population, Energy and Environmental Program (EAP) (English and Spanish) | 08/02 | 027/02 |
| | Bank Experience in Non-energy Projects with Rural Electrification Components: A Review of Integration Issues in LCR | 02/04 | 052/04 |
| | Supporting Gender and Sustainable Energy Initiatives in Central America | 12/04 | 061/04 |
| | Energy from Landfill Gas for the LCR Region: Best Practice and Social Issues (CD Only) | 01/05 | 065/05 |

GLOBAL

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|--|---|-------|--------|
| | Impact of Power Sector Reform on the Poor: A Review of Issues and the Literature | 07/00 | 002/00 |
| | Best Practices for Sustainable Development of Micro Hydro Power in Developing Countries | 08/00 | 006/00 |
| | Mini-Grid Design Manual | 09/00 | 007/00 |
| | Photovoltaic Applications in Rural Areas of the Developing World | 11/00 | 009/00 |

| <i>Region/Country</i> | <i>Activity/Report Title</i> | <i>Date</i> | <i>Number</i> |
|-----------------------|---|-------------|---------------|
| | Subsidies and Sustainable Rural Energy Services: Can we Create Incentives Without Distorting Markets? | 12/00 | 010/00 |
| | Sustainable Woodfuel Supplies from the Dry Tropical Woodlands | 06/01 | 013/01 |
| | Key Factors for Private Sector Investment in Power Distribution | 08/01 | 014/01 |
| | Cross-Border Oil and Gas Pipelines: Problems and Prospects | 06/03 | 035/03 |
| | Monitoring and Evaluation in Rural Electrification Projects: A Demand-Oriented Approach | 07/03 | 037/03 |
| | Household Energy Use in Developing Countries: A Multicountry Study | 10/03 | 042/03 |
| | Knowledge Exchange: Online Consultation and Project Profile from South Asia Practitioners Workshop. Colombo, Sri Lanka, June 2-4, 2003 | 12/03 | 043/03 |
| | Energy & Environmental Health: A Literature Review and Recommendations. | 03/04 | 050/04 |
| | Petroleum Revenue Management Workshop | 03/04 | 051/04 |
| | Developing Financial Intermediation Mechanisms for Energy Efficiency Projects – Focus on Banking Windows for Energy Efficiency | 08/04 | 058/04 |
| | Evaluation of ESMAP Regional Power Trade Portfolio (TAG Report) | 12/04 | 059/04 |
| | Gender in Sustainable Energy Regional Workshop Series: Mesoamerican Network on Gender in Sustainable Energy (GENES) Winrock and ESMAP | 12/04 | 062/04 |
| | Women in Mining Voices for a Change Conference (CD Only) | 12/04 | 063/04 |
| | Renewable Energy Potential in Selected Countries: Volume I: North Africa, Central Europe, and the Former Soviet Union, Volume II: Latin America | 04/05 | 070/05 |
| | Energy Efficiency Operational Exchange Program (CD Only) | 06/05 | 076/05 |
| | Renewable Energy Toolkit Needs Assessment | 08/05 | 077/05 |

Last report added to this list: ESMAP Technical Paper 077/05.