



## **GEF-FAO Workshop on Productive Uses of Renewable Energy: Experience, Strategies, and Project Development**

Summary Report

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***An expert workshop on the productive uses of renewable energy in developing countries was convened in Rome in June 2002 by the Global Environment Facility and the Food and Agriculture Organization of the United Nations. The 35 workshop participants came from development agencies, non-governmental organizations, private companies, research institutes, and universities in 15 countries (list of attendees attached). They shared their practical experience with productive use projects and formulated strategies and tools to help international project agencies prepare effective productive use projects. In the process they considered a range of issues, including priority applications, stakeholder participation, and project sustainability and replication. This report highlights some of the key results and messages from the workshop. A full workshop report is forthcoming.***

### **Productive Uses and Development Benefits**

In rural areas of developing countries, small amounts of energy—in the form of electricity, heat, and motive power—can have very positive impacts on income, education, health, and food security. For example, at each stage in the food provision chain, there are opportunities to provide modern energy services and increase productivity, improve product quality, and reduce losses. Traditional energy—particularly in the form of biomass, animal manures, and human motive power – has provided the bulk of rural energy needs, although use of modern sources such as LPG, grid electricity and diesel power is growing. However, there are many opportunities for renewable energy technologies to provide income generation, social services like education and health care, food security, and other important development benefits. In fact, for many applications, renewable energy technologies can be the least-cost source of reliable modern energy.

The workshop highlighted case studies and examples of several types of productive-use applications of renewable energy for income generation and social services, such as:

- Income generation:
- water pumping for irrigation
  - cottage industry like sewing, weaving, handicrafts
  - agro-industry processing
  - crop and meat drying and freezing
  - kiln firing for pottery
  - welding and wood-working

- Social services:
- home, school, and community-center lighting
  - water pumping for drinking
  - medical equipment in health clinics
  - community street lighting
  - telecommunications and computing centers

Participants stressed the importance of productive uses that assist women in particular to earn income, such as lighting to extend the opportunities for weaving or other cottage industry in the evenings. Participants also emphasized applications that address the needs of women for time- and labor-saving, cooking, and education.

Experience to date from a broad cross-section of existing and completed activities supports the conclusion that increased attention to and investment in renewable energy for productive uses would produce important benefits for the rural poor. Benefits such as increased cash incomes, community development, enhanced lighting for education, improved health services, lower indoor air pollution, and reduced labor burdens on women have all been documented. Increased income and fulfillment of social needs in turn allows greater use of modern energy and more widespread investments in renewable energy, with further environment and development benefits.

### **Lessons From Emerging Experience With Productive Uses**

Participants discussed the lessons suggested by the emerging experience with productive uses of renewable energy. Highlights of these discussions include:

1. Productive-use projects can occur with very little or no participation of energy sectoral authorities—but instead can be guided by development sectoral authorities (agriculture, education, water, entrepreneurship, etc.) with the assistance of energy experts who understand how to integrate renewable energy into these development sectors.
2. Productive uses can be facilitated not only by the provision of small amounts of electricity, but also by the input of heat or mechanical energy. One such example was a silk reeling process utilizing heat produced from biogas. Another example was shaft power for grinding.

3. Sustainability of the results of productive-use projects and replication of these projects in ways that don't require continued donor aid are often daunting challenges that require innovative solutions. Sustainability and replication in productive use applications can be even more challenging than in traditional rural energy projects.
4. Entrepreneurship is a key element of many productive-use applications and strategies, either as a means for end-users themselves to generate income with renewable energy, or as a means to deliver renewable-energy-based technologies and services to end-users. Public agencies need better tools and methods to support entrepreneurship and need to facilitate access to business finance. For some situations, entrepreneurial and organizational skills may be more important than technical skills.
5. Microcredit can be another important aspect of productive-use projects to ensure affordability and facilitate replication and private-sector involvement. Microcredit will require "external" financing from sources beyond a local community. Renewable energy specialists are not necessarily well-versed in implementing microcredit; for example, in tying credit repayment to seasonal variations in household income.
6. Government programs, sustained public subsidies, and other forms of public assistance may be essential for some productive-use applications, even if there are clear and compelling roles for entrepreneurs and private sources of financing.
7. Lack of access to (cash) markets jeopardizes the success of productive-use projects and marginalizes rural people. Small producers in isolated rural areas have difficulty in obtaining access to markets. Workable and low-cost access to markets is needed when output from income-generating activities exceeds local needs.
8. Much more data and analysis is needed on the social and economic benefits and impacts of different types of productive-use applications.

### **Project Development Guidance and Strategies**

Participants made the following recommendations for multilateral and bilateral agencies and others developing productive-use projects:

1. Focus on supporting high-value products and services, while remaining technology neutral. Productive use projects should not be "technology push" approaches that start with a specific technology solution and try to find matching needs. Rather, they should start with the need for income or social services and look for the best solutions.
2. Work across traditional sector boundaries to integrate energy with activities in the agriculture, education, health, water, and rural development sectors. So-called "cross-

sectoral,” “multi-sectoral” or “inter-sectoral” activities within agencies and among development professionals and officials should be encouraged within specific organizations and also within national and local governments. Productive use projects should be treated as sectoral development projects, not as “energy” projects. Cross-sectoral approaches are often very challenging, both substantively and institutionally.

3. Perform market analyses prior to project development. Such analyses would include user needs, affordability, availability of complimentary resources and inputs, access to markets for products, urban vs. peri-urban vs. rural market segments, and other factors.

4. Develop project development guidelines and other practical advice for those preparing productive use projects. For example, participants called for standardized approaches to the documentation and valuing of project benefits.

5. Go beyond home lighting applications. Many rural renewable energy development projects have primarily focused on household lighting using solar home systems (SHS). While such systems provide important social benefits and also may facilitate home-based income generating activities, there are a wide variety of productive-use benefits that can only be captured through applications other than home lighting. These other applications have been neglected in historical development practice.

6. Plan and budget for documenting social and income impacts. Normal project reporting practices for the vast majority of past renewable energy projects have not adequately focused on productive-use impacts. Such efforts must avoid biases and come up with cost-effective methods—as documenting impacts can be expensive.

7. Ensure participation by project beneficiaries and other affected stakeholders through all stages of the project development and implementation cycle, particularly for defining needs and preferences, understanding local conditions, addressing gender issues, and ensuring sustainability (sustainability is often a social issue, not just a financial or technical one). Beneficiary and stakeholders definitions of what is “productive” may differ from established ideas of outside experts. Established gender analysis and social cost-benefit methods can be employed.

8. Encourage demonstration of alternative business models including co-ops, franchises, joint public-private enterprises, and fully private entities. Business development timing and cash-flow constraints should be considered carefully, as well as ways of judging replication potential. Many productive use applications are commercially viable, such that services can be delivered by the private sector with low or no subsidies.

9. Consider a variety of points of intervention. Some successful projects have recruited and supported entrepreneurs who develop business plans for delivery of renewable-

energy-based products and services. But in some circumstances a private-sector delivery mechanism may not be the best choice. Other projects have begun with specific sectors and identified ways to incorporate renewable energy in those sectors, often in partnership with local authorities. Each intervention approach has its uses, but agencies need local knowledge and experience to choose intervention points.

### **Further Activities**

Productive uses are becoming higher on the agendas of many development agencies, including bilateral donors and the Global Environment Facility and its implementing and executing agencies (UN Development Programme, UN Environment Programme, World Bank, FAO, UNIDO, and regional development banks). Continued dialogue and partnership among these agencies is needed, along with direct links to those local groups and organizations who best understand the needs and opportunities in specific local and national circumstances. Also needed are direct links to public officials in a position to integrate renewable energy into activities in agriculture, education, health, water, and rural development. Further activities should help forge these linkages.

Participants agreed that further sharing of experience, case studies, lessons, and impacts of productive uses will be essential. Suggestions were made for an open-access clearinghouse or “library” of applications that makes information readily available to project developers. Further channels are needed to those in developing countries with information to contribute to the library and with experience to share. Information needs include applications, technology choices (including size and complexity options), operations and maintenance costs, appropriate matching of energy sources and characteristics to productive use, participation strategies, and sustainability and replication models. Further work should also establish resource assessment guidelines to ensure sustainability and price stability of rural biomass supplies, given that agricultural producers are often energy suppliers (participants expressed concern about constraints on rural biomass resources if used for both food and energy).

The GEF is in the process of formalizing a strategic priority around productive uses within its renewable energy program and expects a greater number of project concepts approved in the future to reflect this priority. Specific project ideas, channeled to the GEF implementing/executing agencies and/or bilateral donors, are entertained from workshop participants and other interested parties.

*The co-organizers gratefully acknowledge the support of USAID and the Dutch government for preparation of the workshop and participant travel. This summary by the co-organizers does not necessarily reflect the views of all workshop participants. Further information can be obtained from Gustavo Best, [gustavo.best@fao.org](mailto:gustavo.best@fao.org), and Eric Martinot, [emartinot@worldbank.org](mailto:emartinot@worldbank.org).*

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