Rural Electrification, Micro-finance and Micro and Small Business (MSB) Development: Lessons for the Nicaragua Off-grid Rural Electrification Project

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1.1 Background
While development institutions have built considerable knowledge in the fields of rural electrification, micro-finance and Micro and Small Business (MSB) development, there is little experience to date with cross-sectoral operations aimed at exploring and exploiting the synergies between these three areas. Traditionally, rural electrification, micro-finance and MSB development initiatives have been pursued separately, reflecting sectoral divisions within both development institutions and governmental organizations. This paper outlines the key considerations for designing operations involving a combination of electrification, micro-finance, and business development services for micro and small businesses for developing the private sector in off-grid areas. By doing this, the paper provides a basis for the design of the Nicaragua Off-Grid Rural Electrification Project.

1.2 Combining Off-Grid Rural Electrification with Micro-finance and Business Development Services
In a 1995 review of the World Bank’s rural electrification projects in Asia, the Bank’s Operations Evaluation Department concluded that the ‘economic returns of rural electrification projects have been considerably lower than expected and a wide range of expected indirect and external benefits have not materialized’ (World Bank 1995). Two of the key problems that have been identified are:

(i) Purely government-, donor- and supply-driven programs have resulted in slow growth in access by poor households and, at times, unsustainable energy service delivery systems; and

(ii) While access to electricity is a necessary condition for many productive uses and for the delivery of many public services, it is not sufficient for development - and many projects have not paid sufficient attention to inputs other than energy.

As an answer to the first problem, innovative public/private partnerships for off-grid energy service provision are being proposed in several new Bank projects. Aiming mainly at the enhancement of economic activity through electrification, these projects are demand driven and offer a range of energy services to match rural users’ ability and willingness to pay. Facilitating the productive use of electricity by rural MSBs can dramatically increase the development impact of such projects. On the demand side, electricity can directly increase the productivity of rural businesses (and thus raise income and employment), which in turn guarantees a higher ability and willingness to pay and thus ensures the sustainability of electricity service provision.

The second problem is being addressed in several projects under preparation through targeted business development services, provision of access to information and communication technologie (ICT – telephones, computers and the Internet) and provision of access to credit by identifying and answering the specific additional needs of rural micro and small businesses, thus allowing for a maximum impact of electrification.

For this purpose, the provision of micro-finance, ICT and business development services to rural areas shows many similarities to rural electricity provision, particularly with respect to barriers and emerging best practices. For all four services, private participation in service provision seems to show the most sustainable results. For all four, public incentives are needed to cope with rural areas’ limited capacity to pay, low demand and high transaction costs.
1.3 The Nicaragua Off-Grid Rural Electrification Project

The planned Nicaragua Off-grid Rural Electrification Project (PERZA) is the first World Bank operation that explicitly links the development of infrastructure services with the development of MSBs and Micro-Finance Institutions (MFIs). The aim of the project, which will have a total cost of about $20 million, is to improve the quality of life in remote rural areas of Nicaragua by (i) electrifying them through the introduction of innovative, private-sector-led off-grid electricity service delivery models, and by (ii) supporting private sector development through the provision of financial and non-financial services to local MSBs. The project will also explore the potential for involving MFIs as providers of credit for electrification, and evaluate the possibility of offering business development services through Rural Business Development Centers where MSB could access basic ICT-based services (ICT: Information and Communication Technology - i.e., telephones, computers and the Internet).

The three first target municipalities that have already been identified for the initial investment phase of the project are El Ayote (Dept. RAAS), El Cua-Bocay (Dept. Jinotega) and La Unión / Nueva Guinea (Dept. RAAS), hosting about 17,000, 16,000 and 17,000 people respectively. Additional sites will be identified using a PHRD grant.

The design of the Nicaragua Off-grid Rural Electrification Project is based on the following assumptions, which are discussed in sections 2.1 through 2.7 below:

1. New approaches to off-grid electrification offer sustainable options to electrify remote rural areas;
2. Integrating energy provision with the provision of other services has the potential to increase development impact – and selecting just a few services may have a higher chance of success than trying to integrate too many;
3. Rural electrification enhances the development of MSBs (productive uses);
4. Business development services (BDS) enhance the sustainability and growth of MSBs and of off-grid electricity service providers;
5. ICT services increase MSBs’ opportunities for communication and help them reach new markets – and low-cost ICT solutions may be particularly interesting for rural MSBs;
6. Strengthening rural micro-finance helps ensure that rural MSBs have access to credit;
7. Rural electrification can be enhanced and broadened with the support of MFIs, which can provide credit to rural communities and households.

Section 2 tackles the seven key issues presented above and draws some preliminary lessons for the Nicaragua project by looking at international experiences and best practices, while Section 3 delineates some of the open questions on which the team needs to focus during project preparation and implementation. A brief description of the Nicaragua project is provided in Annex 1, which draws from the Nicaragua Concept Document currently under preparation.

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1 For an interesting analysis of the links between infrastructure, development of MSBs and micro-finance institutions, see Allederdice A. and Rogers J. (2000).
2 Of which $9 million is an IBRD/IDA loan, $6 million is from the Government, $3 million is from the private sector and $2 million is from the GEF.
3 Exclude credit provision services, which are addressed under points 6 and 7. When both financial and business development services are provided, it is advisable that they are offered by different institutions (micro-finance institutions are ideal credit providers, while business associations, universities and business development services organizations are the reference institutions for provision of BDS).
2. Lessons from international experience and key issues for the Nicaragua Off-grid Project

To explore the links between rural electrification, micro-finance and MSB development, the authors have carried out a desktop review of the international literature discussing these three topics and the potential for their integration. The main findings of this review are reported in the seven sub-sections below, together with some lessons that could be useful for the Nicaragua project.

2.1 Electrification of Remote Rural Areas

More than two billion people in the world lack access to modern energy today (World Bank 1996), most of them in rural areas. Some of those will be served by grid connections over the next decades - but large numbers will remain unconnected because of the high costs of grid extension to remote areas.

Off-grid electrification (i.e. minigrids and isolated systems that are not connected to the national interconnected grid system) can provide an alternative solution for many of those remote users, at lower costs than grid extension. Renewable Energy Technologies (RETs) are increasingly used for the off-grid electrification of remote, low-demand rural users. Thanks to declining costs, renewables have significant cost advantages in off-grid areas over traditional diesel-generation (which involves high fuel transport and maintenance costs) and also have additional environmental benefits. For photovoltaic technologies, the price per peak watt has declined from about US$40 in 1970 to under US$30 in 1978 and less than US$5 in 1993 (Acker & Kammen, 1996, pg. 89). Two typical types of renewables-based off-grid service provision systems are solar home systems (SHS) and village hydro-mini-grids (Foley 1995; Fraunhofer 1995; World Bank 1996).

Power for off-grid areas may be supplied through two basic distribution options: village minigrids (serving tens to thousands of users) or isolated systems (serving just one or two users), and power may be generated from a variety of resources: using diesel-, biomass-, wind-, PV-, or small hydro-generators, or hybrid combinations of these. Depending on the characteristics of a specific use (i.e. ability and willingness to pay and load profile) and the local supply options, the most suitable solution for a rural off-grid system may consist of any combination of the above options.

The World Bank Group is currently preparing and implementing a number of projects with off-grid rural electrification components. Many of these are testing new project design approaches for the first time. The goal of this new generation of projects is to help build sustainable local economic activity that will persist beyond the development assistance phase. To this end, they have to overcome
existing market barriers, on both the demand side (e.g., information, awareness, training, participatory approaches, local ownership) and the supply side (e.g., business development services, market surveys, databases of renewable energy resource availability), combined with new financing schemes (e.g., micro-finance, consumer credit, and revolving funds) and institution building (e.g., government, regulators, quality assurance and certification institutions).

The main emerging business models for off-grid energy service provision are: (i) equipment dealers (cash sales or finance leasing) where the market is ready on demand and supply side (e.g. Sri Lanka and Indonesia); and (ii) rural energy service companies (ESCOs) or cooperatives, working with licenses or concessions (see e.g. Covarrubias 2000 on off-grid concessions in Argentina).

Private sector-led models seem to show the greatest potential, but are only sustainable if they allow for profit beyond the short term. However, market entry in rural off-grid markets is still considered high risk by the private sector due to the undeveloped market, low density of rural customers, lack of a service network and financing sources for customers, and high transaction costs incurred for serving a low volume of customers. Balancing maximum private sector participation with risk mitigation measures is hence a main challenge for new rural service delivery mechanisms. Since a large fraction of the service costs are local services (M&O, fee collection, marketing), the value added by service provision in the target region may be high.

Examples of recent rural off-grid projects in the Bank Group’s portfolio include the India and Indonesia Solar Home System projects, the Argentina PERMER (World Bank 1999a), the Uganda and Sri Lanka rural electrification projects, the Solar Development Group, the IFC/GEF Photovoltaic Market Transformation Initiative (PVMTI), a number of small loans to PV companies carried out by the IFC/GEF SME Program and several innovative projects funded by the World Bank’s Energy Sector Management Assistance Programme (ESMAP).

Based on the lessons learned (e.g. Barnes 2000; Martinot and McDoom 1999; Martinot et al. 2000; Reiche 2000), critical steps for the Nicaragua Off-grid Rural Electrification Project include:

- Integrate off-grid policy into overall energy sector policy (regulations, level playing field);
- Assure that existing small and medium-sized service providers are not crowded out by project;
- Design targeted and efficient “smart subsidies” in a transparent way, secure funding and define exit strategy;
- Conduct market surveys to match service types and levels to the demand (ability and willingness to pay);
- Adapt public-private partnership delivery models to local needs and conditions;
- Weigh advantages of exclusive concessions versus licenses under local boundary conditions (market size, electrification target, existing suppliers, transaction costs, economies of scale and scope);
- Adapt regulation to special requirements of off-grid service quality;
- Answer the specific social challenges of mini-grids (allocation of limited power and energy);
- Choose promising pilot sites for first phase, and assure replicability of pilot phase design;
- Design suitable credit mechanisms for SHS to finance high up-front costs;
- Offer several service levels and include small SHS system sizes;
- Support policy development and capacity building;
- Develop codes and standards and establish certification, testing, and enforcement institutions;

**Village mini-grids** - Clusters of consumers located far from existing utility grids are often served by isolated mini-grids or micro-grids. The distribution system is similar irrespective of the sources producing the power for it (e.g. a local diesel generator, a local renewable-energy source, or hybrid-battery systems). Mini-grids may also be upgraded later through grid connection. The capital costs for a low-voltage distribution line are typically around $5 per meter and the costs of connection and electricity meter may be around $100. The generation costs vary according to village load profile, availability of renewable resources, and fuel transportation costs. Where the resource is available and easy to access, small to micro hydropower plants will usually allow for the lowest lifecycle costs per kWh.
• Conduct consumer awareness and marketing programs for new technologies (SHS);
• Design battery recycling concept and assure that mini-hydro-sites are environmentally sound;
• Ensure that users pay substantial part of lifecycle costs (payment creates ownership);
• Involve users and communities in decision and implementation (participation creates ownership); and
• Design monitoring mechanisms to supervise both firms’ and users’ compliance with the contracts – these are particularly important in remote areas, which are more difficult to monitor.

2.2 Integrating Energy Provision with the Provision of Other Services

Lack of access to modern energy in developing countries is of the same order of magnitude as lack of access to other basic services, such as clean water, roads, modern telecommunications and credit for micro and small business. In addition, poor urban or rural communities often lack access to more than one basic service, both because of the communities’ low ability to pay for infrastructure provision and because of the high cost of service delivery. In this section of the paper, we present the potential benefits of integrating the provision of energy with other services, i.e.,: water, telephony, computers, business development service and credit. The following sections of this paper narrow the focus by analyzing only the services that will be provided in the Nicaragua off-grid project: i.e., electricity, business development services, access to ICT (telephone, computer and the Internet) and credit. The authors plan to address in greater details the potential for integration of all services in a subsequent publication.

Combining the provision of several services has the potential to boost living standards far in excess of the individual impacts of each service - it promises to alleviate poverty, while increasing economies of scope on the supply side, and ensuring higher efficiency on the implementation side.

• On the demand side, recent evidence has shown a more than linear increase in benefits for the poor, when bundling several services together (World Bank 1999b).

• On the supply side, the low demand and high cost of business in rural areas suggest “bundling” of services to profit from economies of scope. The concept of “multi-utilities” is of special interest to remote rural areas, where the main cost savings would stem from leveraging the high costs of accessing the dispersed clients. While some services allow for such “bundling” through one provider (e.g. provision of electricity, water and telephony, as in the case of many rural cooperatives), the three services of main interest in this paper will probably be provided best by separate entities, as their business models and capacity profiles are quite different. As opposed to “bundled service provision”, the more general term “integrated service provision” is therefore used here to describe a coordinated project implementation, that does not explicitly demand bundling. However, even without the formal formation of “rural multi-utilities”, supply side synergies can be realized: An interesting example for such a benefit from synergies on a more decentralized community level can be found in Jujuy (Argentina), where the local operators of remote village mini-grids collect the fees for both energy service and domestic satellite TVs – for two separate companies. Such synergies at the community level should be explored for the three services at hand in the Nicaragua case (i.e. electrification, micro-finance, and BDS). The costs and benefits of horizontal integration have to be assessed for each specific situation, and for each level of the delivery chain. A first step towards letting the markets decide on this cost-benefit assessment case by case would be to level the playing field for such integration on various levels.

• On implementation level, a common project coordination unit and joint tenders may allow for additional synergy effects. Especially indirect subsidies for market development (e.g. rural market

4 The broader publication will be financed by ESMAP (see footnote on the first page).
surveys) show a high potential for leveraging costs. However, it has to be noted that projects covering more than one sector will most probably need higher supervision budgets, which raises transaction costs and will have to be weighed against the advantages of integration by donors and client Governments. While past experience has shown that the higher cost of coordination between sectors (on all implementation levels) may easily outweigh potential cost savings due to synergies (see box in World Bank 2000 on the failure of the integrated rural development projects of the 70s), it is hoped that through bundling of just two or three concrete services (that match the specific local demand) this coordination problem can be controlled. Early experience on rural energy and ICT from the Mexican Telesecundaria program shows that projects may substantially profit from the similarity of the barriers to rural infrastructure provision, if they transfer lessons learned from one sector to the other, in order to avoid pitfalls.

Out of all potential integration/bundling options between the rural services and the rural uses (applications) that are presented in the matrix “rural uses and services” below (Table 1), several World Bank projects currently under preparation are selecting the most promising combinations for their specific client situation. Some typical benefits are inserted in the table for illustration.

Based on the lessons learned, critical steps for the Nicaragua Off-grid Rural Electrification Project include:

- Being aware that combining too many sectors may result in exponential growth of coordination problems (if coordination is not completely decentralized);
- Paying attention to additional need for cross-sectoral coordination on central and local level (the latter have seemed to be less problematic in past projects – see World Bank 2000), as well as to higher supervision costs on donor side; and
- Conducting well designed demand surveys to assure that service types and levels match demand.
### Table 1: Rural Services and Rural Uses

<table>
<thead>
<tr>
<th>USES SERVICES</th>
<th>Household, Social and Community Uses</th>
<th>Productive Uses (MSB)</th>
<th>Education Uses</th>
<th>Health Uses</th>
<th>Public Administration Uses</th>
</tr>
</thead>
<tbody>
<tr>
<td>Electricity</td>
<td>Improved quality of life (light, TV, radio). Light: children and women gain additional time at night (reading, homework - Barnes 2001). Improved light quality (200 times brighter) and cost per lumen. Reduced cooking times and easier cleaning due to illuminated room. Increased productivity for self consumption. Safety: Street-lighting allows children and women to socialize at night. Facilitates community activities (light, TV, radio, discotheques). Potential effect on birthrates?</td>
<td>Raises productivity → increased profit and employment. E.g. light extends work time; electricity allows applications such as water pumping (irrigation), soldering, motive applications (drilling, sawing, mills), cold chain (e.g. for small shops and restaurants, milk processing, beef storage), fish ponds, electric fences, video cinemas, etc. Permits use of ICT.</td>
<td>Studying at night; adult education.; allows retention of qualified teachers. Schools can serve as anchor clients for service providers. Subsidizing public services is an efficient way of targeting subsidies with reduced free rider effects.</td>
<td>Light for emergencies, childbirths, vaccine fridges; HIV. Domestic light seems to be correlated with more whitewashed walls and less bugs (e.g. Chagas)</td>
<td>Allows for more efficient public administration. Increase working time and improves quality of service.</td>
</tr>
<tr>
<td>Other Energy (e.g. LPG, traditional fuels)</td>
<td>Clean cooking.</td>
<td>Rural industries are often energy intensive → more efficient production methods → increased profit (Bolivia ESMAP 2001).</td>
<td>Being cold or too warm significantly decreases capacity to study (Bolivia ESMAP 2001)</td>
<td>Tool Sterilization, Vaccine fridges.</td>
<td>More efficient services. Improved heating and cooling → labor efficiency</td>
</tr>
<tr>
<td>Water</td>
<td>Clean drinking water. Reduction in water transport time</td>
<td>Irrigation.</td>
<td>Access to clean water improves children’s health and increases opportunities for education (e.g., increases class attendance).</td>
<td>Reduction of infectious and intestinal diseases</td>
<td></td>
</tr>
<tr>
<td>Rural Telephony</td>
<td>Social inclusion; social capital (contact to relatives).</td>
<td>Facilitates contact with customers and suppliers; increases market potential; increase internal efficiencies.</td>
<td>Qualified personnel more likely to come to rural areas.</td>
<td>Medical consultations. Emergence communication.</td>
<td>Greater and cheaper communication between centralized and rural public administrations.</td>
</tr>
<tr>
<td>Other ICT (i.e., fax, computer, the internet)</td>
<td>Inclusion, access to information. Allows clustering of presently isolated civil society bodies for stronger voice and political inclusion (grass-root movements, remote-polling, e-mail forum etc.) “Global village”; International e-mail friendships, employment opportunities, Remittances; remote order of goods paid for by better-off relatives; direct donations from individual private donors through www.</td>
<td>Facilitates contact with customers and suppliers; increases market potential; increase internal efficiencies. Potential for online commerce (B2C, B2B and B2G → increased income). Online business training (see section below); use of software to improve planning, marketing, financial and managerial accounting, quality control and inventory management.</td>
<td>Distance learning: computer literacy; individual, and interactive learning; &quot;talent scouting&quot; through interactive &quot;online-tests&quot;.</td>
<td>Medical consultation: distance diagnosis and treatment (telemedicine). Health databases and expert systems. Health Education. Epidemiology. Improved management of rural health units. Increased opportunities for decentralization of responsibilities and management of resources.</td>
<td>E-government, both at central and local level. Increased administrative efficiency; transactions between government, businesses and citizens facilitated; enhanced decentralization, transparency and accountability. Decentralized census, tax payment, business registration, licensing, emission of certificates (e.g., birth, marriage, death, driver licenses).</td>
</tr>
<tr>
<td>Business/ Management Development Services (i.e., training and advisory services)</td>
<td>Increase households’ income; facilitates development of business and personal relationships among people attending the same training courses (both from the same village and or close villages).</td>
<td>Increase MSBs’ growth and profitability, e.g. through improved planning and budgeting, marketing, reporting, financial accounting, inventory and supply chain management, market and product diversification.</td>
<td>Management tools may improve schools’ efficiency and effectiveness, e.g., through strategic planning, budgeting, accounting, performance evaluation.</td>
<td>Improve efficiency and effectiveness of hospitals and local health units, e.g., through strategic planning, budgeting, accounting, performance evaluation.</td>
<td>Improve efficiency and effectiveness of public administration, e.g., through strategic planning, budgeting, accounting, performance evaluation. Increases opportunities for decentralization.</td>
</tr>
<tr>
<td>Micro-finance</td>
<td>Opportunities for improving living conditions, e.g., credits for housing improvement, connection to water and electricity.</td>
<td>Increases MSBs’ growth and profitability through increased access to credit for productive uses (investment and working capital).</td>
<td>School loans</td>
<td>Insurance. Credit to small pharmacies</td>
<td></td>
</tr>
</tbody>
</table>
2.3 Enhancing Productive Uses of Rural Electrification through MSB development

While there is a wealth of anecdotal evidence suggesting that rural electrification promotes business development, there are few statistically detailed studies available to support this assertion. One such study is a household energy survey carried out by the World Bank in four rural provinces of the Philippines during the year 2000 (World Bank Draft, 2001). This study assessed inter alia the impact of electrification on MSB development and growth by showing that households with electricity:

- **have higher incomes.** Households using electricity for their home businesses had the highest income, $77 per month. Households having electricity but saying that they did not use it specifically for business purposes had an average income of $42 per month, while households without electricity had the lowest average income: $21 per month.

- **are more likely to engage in home business.** About 22% of the households with electricity surveyed in the study engaged in some form of home business, versus only 15% of non-electrified households.

- **have a larger variety of home businesses.** The households without electricity operated small variety stores, tailors, dressmakers, food stands and restaurants. Households with electricity were also engaged in carpentry, hairdressing, barbershops, laundries and movie rentals.

- **may spend more time working for their businesses - although additional time spent working was not found to be “per se” related to higher income.** Households using electricity for their home businesses raised working time by approximately 4 hours per day. Households with home businesses that had electricity but stated that they did not use it specifically for business purposes (e.g., they used it for reading in the evenings or watching TV) raised time spent working on the home business by approximately 2 hours per day. An interesting finding of the study is that increases in business income were not related to increases in time spent working. This finding implies that rural income is often not driven by the number of working hours, but by the type and quality of product or services a business provides.

It is important to note that, because different kinds of businesses have different energy needs, the nature of the electrification system that is put into place will have an effect on the types of business that are likely to develop. Below is a summary of the energy needs of different types of businesses and possible solutions:

- Businesses making use of power tools, grain mills or other large motors have high power and energy requirements and hence need diesel or hybrid systems (any combination of solar PV, wind, biomass, gasoline or diesel generator with a battery and an inverter);

- Businesses involving water pumping, ice making and battery charging can occasionally be operated by simple systems that do not require energy storage (water pumps can be driven either directly by a windmill – rural best practice for many centuries - or by a diesel or PV generator. Which of these solutions is cheaper depends on the specific type of water use - e.g. whether drip irrigation is possible);

- Businesses involving process heat, cooking, hot water (hotels) and drying for food preservation should use thermal technologies (e.g., efficient biomass ovens, solar thermal water heaters or improved cook stoves);

- Businesses requiring only lights, radios, TV, small ICT or cell phones may be operated using small PV systems (20-500Wp) and wind electric systems (300-1000Wp). Most of these appliances can be operated using direct current (DC). If alternating current (AC) is needed, a small inverter can be included.

Based on the lessons learned from the experience of rural electrification in the Philippines and from other initiatives currently under development, critical steps for the Nicaragua Off-grid Rural Electrification Project include:
• Conducting a survey of pilot sites to identify MSBs and determine their business profiles (e.g., their average sales, their founders’ average number of years of education), energy needs, business needs, potential for productivity gains, potential for non-electric energy improvements. To this end, the “classical” random sample off-grid energy household survey should be accompanied by targeted village level focus groups aimed at assessing the potential applications of electricity for MSBs and MSBs’ business needs;
• Evaluating the potential impact of rural electrification on the development of new MSBs and on the growth of existing MSBs, and target financial and non-financial services to MSBs making extensive use of electricity and with the highest development potential;
• Adopting the new rural electrification systems according to the specific energy needs of local MSBs, in addition to the needs of the other clients (public services and households).

2.4 Business Development Services (BDS) to Enhance Growth of MSBs and Energy Service Providers

Business Development Services include training, consulting and advisory services offered by both private and public institutions with the objective of improving enterprises’ critical business processes and subsequent financial performance. For the purpose of this paper, we will focus on BDS that can be offered to: (a) MSBs and (b) energy service providers.

(a) BDS for Micro and Small Businesses: For MSB, increased revenues come from assistance in finding new customers, reaching higher-income target markets, and designing and selling new products. MSBs located in rural areas tend to operate within their communities, selling their services and goods to low-income local customers. As they have very few or no contacts with businesses belonging to the formal economy, they are often unaware of potential market opportunities outside of their villages and end up perpetuating their low turnover and profits. Business advisory programs can break MSB’s isolation and dependence from low-income communities by linking them to high income markets and by helping them succeed in selling their services and products to these new customers. Cost reductions for MSBs come from assistance in finding new suppliers, improving inventory management (e.g., by minimizing the costs of under-stocking and over-stocking), introducing managerial systems to track costs and identify product profitability and introducing accounting systems (i.e., income statements, balance sheets and cash flow statements), allowing MSBs to monitor and improve their financial performance.

It is important to note that the immediate effects resulting from business assistance programs are changes in MSBs’ actions and processes, which may lead to – but do not guarantee - increase in MSBs’ revenues and decrease in costs (see, among others, Nexus Associates, 2000).

(b) BDS for Energy Service Providers: The key BDS for off-grid electricity suppliers is business planning, as most of these organizations are in a nascent phase (The Solar Development Grant Facility addresses this specific need, see e.g. Reiche 2000). Advice and training courses should help off-grid electricity providers to prepare and refine their business plans by assisting them conducting market assessments, preparing financial projections, identifying financing options (i.e., national and international sources for equity and credit), identifying low-cost new technologies, carrying out procurement practice and training users. These services would help off-grid electricity providers to start their activities and to develop them in an efficient and sustainable way - in a more advanced phase of development, other managerial tools will also be needed (e.g., managerial accounting, financial analysis). Lessons on BDS for off-grid electricity suppliers could be learned from the few off-grid service providers currently operating in a few countries around the world, and from the projects that development institutions are carrying out in this field.

Donors and governments have long recognized the importance of BDS in fostering business development. However, there is a consensus that traditional BDS projects – especially when publicly funded – have not achieved their expected development impact (i.e., increase enterprise productivity
and profitability, leading in turn to job creation, economic growth and poverty alleviation). The traditional donors and governments approach of providing BDS directly to MSBs or permanently subsidizing BDS delivered by private providers has failed to achieve significant outreach and has been characterized by low profitability. Such programs usually cease when public funds are exhausted. (World Bank, Committee of Donor Agencies for Small Enterprise Development, 2001; Hallberg K. 2000; and Swiss Agency for Development and Cooperation, 2000).5

Recent experiences suggest that public and donor intervention should be shifted away from direct provision of BDS or support to particular BDS providers. Rather, intervention should be directed towards fostering supply and demand for BDS and reducing subsidies for client businesses, to develop sustainable markets for service provision.

On the basis of lessons learned from past experience with BDS critical steps to be taken during the development of the Nicaragua Off-grid Rural Electrification Project are:

- Identifying the specific needs of local MSBs – i.e., what MSBs currently want, scale of demand and ability and willingness to pay for specific services. The needs of MSBs vary according to the industry to which they belong, the community where they are located, and the age and gender of the entrepreneurs. Surveys and focus groups should be carried out to assess MSBs’ needs correctly;
- Selecting BDS providers that deliver services in a professional manner. They must be entrepreneurial, demand-led and act as commercial market players. Private, for profit providers tend to demonstrate these characteristics best;
- Being aware of the potential for the crowding out (displacement) effect of direct or subsidized provision of services by donors and governments;
- Designing time-bound subsidies with specific criteria for reduction and elimination as market development objectives are achieved. These subsidies would be mainly used for development of on-line local content, research and development (R&D) and for initial operating costs such as facility development and staff training;
- Developing and offering specifically-targeted BDS to new off-grid service providers; and
- Address the specific barriers of BDS provision in remote rural areas.

2.5 Access to ICT for MSBs: Development of Rural Business Centers

ICT-based Business Centers are in very early stages of implementation in urban and peri-urban areas of developing countries all over the world. The development of ICT-based Centers is part of the Governments’ and donors’ effort to reduce the digital divides (i.e., gaps in access to and use of telephones, computers and the Internet) between high and low-income segments of the population and between large and micro and small businesses.

While various types of ICT-based Centers (Infocenters or Telecenters) have been developed in several countries, few qualify as “Business Centers” by offering services specific to MSBs. Most ICT-based Centers provide computer and Internet access to the entire community in which they are located. Studies of the effectiveness of Multipurpose Telecenters have found that a number of barriers preclude access of the poor and the rural populations to the Centers (Proenza F., Bastidas-Buch R., Montero G., 2000, Draft; and National Telephone Cooperative Association - NTCA, 2000). These include time and transport costs, limited education of potential users, lack of computer literacy and lack of technical facilities and staff to maintain equipment.

Traditionally, BDS have been provided through conventional training courses. More recently, the forms of delivering BDS are changing from the traditional classroom approach to other forms, such as one-on-one workshops, distance learning and grassroots management training, and ICT-based training. While many of these approaches are likely to better meet the specific needs of different types of businesses, most of them are still in an experimental phase, and their potential impact on MSB development and growth has not been assessed yet.
Even though statistical measurement of ICT impact on MSBs has been very limited to date, some surveys have reported that there is a positive relationship between the introduction and development of ICT technologies and the performance of MSBs. Specifically, positive relationships have been found between the use of the Internet and rising income and employment and between the use of e-commerce technologies and favorable impact on customer service, expansion of employment skill sets, lowered operating costs and increased sales (OECD, 2000; and The Australian Bureau of Statistics, 1998 and 1999).

The World Bank’s Guatemala and Nicaragua competitiveness projects include components aimed at developing specific ICT-based Business Centers for low-income MSBs (Micronet Centers in Guatemala and e-Centro in Nicaragua). (For a detailed description of these initiatives see: Guatemala competitiveness: Project Appraisal Document, 2001; and Nicaragua Competitiveness: Project Appraisal Document, 2001; Weber 2001). These Centers plan to offer MSBs access to telephones, fax, computers and the Internet, as well as training on how to use these facilities to better manage their businesses and take advantage of new market opportunities. They also plan to provide software for simplified business planning and problem solving in production, finance, accounting and marketing (i.e., ICT-based BDS services). Finally, they envision giving MSBs access to e-commerce trading platforms, to assist them in exchanging information and carrying out online transactions with customers and suppliers.

To date, there is only limited knowledge on the potential value for ICT-based solutions for rural MSBs. Especially in very remote areas, some promoted ICT solutions would be oversized for the potential demand (e.g. Honduras Net-Villages). On the other hand, specific types of MSBs and SMEs in remote rural areas may profit highly from full ICT solutions: an example would be a rural coffee cooperative using ICT solutions to manage hundreds of small farmers, documenting crop quality and establishing sales links to “fair-price” buyers in developed countries. It will be an important challenge for all future rural BDS projects to assess the specific local demand for “low-cost Rural Business Centers”, as well as the potential of extending low-cost ICT-based solutions into rural target areas, to enhance the provision of BDS services. For a sustainable BDS provision to remote rural areas, it will be crucial to match both content and tools to the specific needs and willingness to pay of the rural target clients.

On the basis of lessons learned from past experience on Multipurpose Telecenters and current experience on ICT-based Business Centers, critical questions and issues to be addressed during the development of the Nicaragua Off-grid Rural Electrification Project are:

- Identifying the information and communication needs of the targeted rural MSBs. Given their remote locations and their small size, these businesses are likely to need only basic communication services (i.e., a few telephones, a fax and a computer in each village could serve all of the local MSBs). Increasing the scope of ICT-based services by extending their offer to MSBs located in sites close to the ones that are being electrified would also be important to strengthen the Centers’ sustainability;
- Assessing whether it is advisable to use the infrastructure for public and productive ICT uses together, (e.g. by using schools equipped for distance-learning as Business Centers for MSBs in the evening); 6
- Assessing under which conditions low-cost Business Centers for MSBs located in rural areas may be sustainable and whether provision of BDS in these areas need to be ICT-based. In addition, assessing whether low-cost internet technologies (e.g. radio, V-Sat) offer a solution for rural Nicaragua (mountainous areas need many repeaters!), and whether local MSBs can serve as extension agents. Finally, verifying whether traveling BDS providers with laptops may represent a feasible solution for the target areas and MSBs;

6 As done by the World Bank’s World Links for Development (WorLD) program in many Latin American countries.
• Identifying private partners willing to invest and manage Rural Business Centers. Strong private sector participation is necessary to guarantee sustainability of the Centers in the long-run;
• Identifying the specific business needs of local MSBs and adapting the facilities, software tools and training courses accordingly (see also section 2.4 on BDS);
• Developing online local content useful to client MSBs. For example, developing sites that provide sector-specific information and information regarding the communities where MSBs are located;
• Encouraging entrepreneurs to develop business skills and adequate managerial systems before embarking in e-commerce initiatives; and
• Designing time-bound subsidies with specific criteria for reduction and elimination as market development objectives are achieved (see also section 2.4 on BDS).

2.6 Rural Micro-Finance for MSB’s

Micro-finance Institutions offer small productive credits (working capital and investments) to MSBs. Loans are usually between $50 and $1,000, with maturity under one year, interest rates higher than the prime rate (about 20%-30% effective rate p.a.) and minimal collateral requirements.

MFIs are key promoters of private sector development in developing countries. In surveys, MSB’s consistently rate access to credit as one of their first priorities.

While many Latin American MFIs have been successful in achieving: (i) large scale of operations (reaching relatively low-income clients), and (ii) low operational costs (low cost per dollar lent), resulting in high returns on equity and high profitability (after adjustments for subsidies), the history of rural finance interventions has not yet yielded impressive results.

Government leadership in rural finance (in Nicaragua and throughout Latin America) has often led to unsustainable loan portfolios operated at a high cost by national development banks, and the diversion of credit from poorer clients to higher income clients. Unregulated savings-based efforts have led to significant losses and have, in some cases, challenged the ability of financial sector authorities to supervise a decentralized set of relatively small-scale institutions. Some early reports of success stories have meanwhile been criticized for biased selectivity in reporting.

There are few rural credit institutions that have successfully reached rural populations and most of them are located in South East Asia – the Region where microfinance is more developed. Four publicly sponsored rural finance institutions that have been successful at providing credit to rural areas in this Region are: Badan Kredit Kecamatan (BKK) and the Bank Rakyat Unit Desa (BUD) in Indonesia, the Bank of Agriculture and Agricultural Cooperative (BAAC) in Thailand and Grameen Bank (GB) in Bangladesh (Yaron, 1995). All four institutions have high outreach levels and have reached full self-sustainability. BKK and GB serve the very poor (i.e., outstanding loans of less than $100), while BAAC and BUD serve lower-to-middle income farmers with average outstanding loans of $300 to $560. In Latin America, a private MFI that has been successful at reaching low-income rural communities is Compartamos. Compartamos is the industry leader in México, with more than 92,000 clients and an outstanding loan portfolio of $25.4 Million - mainly in rural areas. Compartamos uses both a solidarity and an individual lending methodology. Thanks to its success, Compartamos has recently became a Sociedad de Objecto Limitado (SOFOL).

While all these institutions represent successful cases of rural microfinance, all of them operate in areas with large potential markets. Serving isolated rural areas with low population concentration

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7 MSBs are willing to pay high interest rates to increase their business activity because the alternatives are to stagnate or borrow at much higher rates from informal sources. Research has shown that low-income entrepreneurs are willing to borrow money from informal sources at up to 100% interest p.a.
represents an additional challenge that MFIs interested in expanding their market to rural areas would need to weigh very carefully.

Based on successful experiences and on the indications of the Bank’s Operational Policy 8.30 on financial intermediation – which offers some guidelines for financial sector interventions targeted to rural areas - we can identify the following key methodological decisions to be made during the Nicaragua project development:

- Choice of lending methodology: options should include individual lending with innovative collateral requirements, solidarity groups, credit unions, village banks, or a combination of these;
- Choice of institutional partner(s): successful, sustainable institutions, interested in broadening and diversifying their portfolios by reaching rural areas and by adding new credit lines.
- Minimum scale of operations to reach full cost coverage: MFIs need to identify their breakeven point by estimating the number of likely credit users in the target communities, and their variable and full costs of operations.

2.7 Enhancing Rural Electrification with Rural Micro-Finance

Rural electrification can be enhanced and broadened with the support of MFIs. In addition to offering credit to micro businesses for productive purposes, MFIs in various parts of the world are now offering credit to rural communities desiring to invest in off-grid electrification systems and to households wanting to connect their home to the distribution system or to buy a solar home system SHS.

For MFIs, the main advantages of providing loans for rural electrification and home connection to the grid are: (i) potentially increasing their scale of operations and profits, (ii) diversifying their lending portfolio, thus reducing the co-variance risk in the overall portfolio and the risk of delinquency (electricity and housing loans tend to out-perform productive loans), (iii) providing additional repayment incentives and resources to proven clients, (iv) gaining access to governmental or donor funds earmarked for housing improvement purposes and (v) receive a collateral with remaining value when financing solar home systems. Since most MFIs face excess demand and have a very constrained capital base, these represent a powerful set of incentives. (M. Goldberg, M. Motta, 2001).

To date, several MFIs have included these lines of credit in their portfolios (The Center for Housing Development Studies, Harvard University, Development Alternatives, Inc-DAI, 2001): Genesis Empresarial (Guatemala), Grameen Bank (Bangladesh), SEEDS (Sri Lanka), SEWA Bank (India) and HPF – Utshani Fund (South Africa). In addition to MFIs, a number of other organizations are providing loans for rural electrification (e.g., COMARCA - a coffee cooperative in Honduras, ADESOL - Association for the Development of Solar Energy and SELCO - India).

A very interesting case of a successful, sustainable MFI that has been lending to Guatemala’s rural communities to support electrification projects since 1983 is Genesis Empresarial. To date, Genesis has provided credits to electrify 247 Guatemalan communities for a total of about 11,200 households. Genesis’ active portfolio in the electrification field is US$1.1 Mil (11% of the total portfolio) and its arrears rates for electrification loans have been very low. For example, in June 2000, only 0.4% of electrification credits were more than 30 days past due. Genesis’ electrification credit program, CIDER, provides credit to communities desiring to invest in PV systems (CIDER Renovable) or electric grids (CIDER Red). A prerequisite for participation in the program is that at least 90% of the community agrees to electrification. Loans range from US$120 to US$450 per household and are offered to clusters of four to twelve rural families from the same community. Liability through group pressure is the primary collateral. In addition, one household in each participating group is required to present some proof of land ownership. The loan maturity is

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8 For a description of some interesting experiences worldwide see Martinot et al., 2000.
9 Genesis Empresarial, internal documents and interviews.
between 1 and 4 years. The nominal interest rates on the loans vary between 21% (on funds from BCIE) and 30% (on funds from commercial banks); the real interest rates are between 15% and 23%. Genesis also offers loans to single households desiring to get their homes connected to the local electrical system. These loans fall in the housing improvement category (which also includes repairs, room additions and connection to the water system). The maximum amount of these loans is about $400. The loan maturity is between 12 and 18 months. The nominal interest rate is 24% (real interest rate: 18%) per year. For these loans, Genesis asks for personal or group guarantees, while formal land titles are not required.

Another important success story is the World Bank’s ongoing Sri Lanka Energy Services Delivery (ESD) project, where the MFI SEEDS has signed a memorandum of understanding with three of the four main local solar companies to provide SHS credits. Since 1999, the monthly SHS sales in Sri Lanka have increased from 80 SHS to about 1,300 SHS, to a large extend due to the availability of micro credit. Currently, the SHS business line of SEEDS accumulates to about US$ 1 million and is expected to reach about US$ 5 million by 2005, which would be 30% of their total micro credit portfolio.

The critical methodological decisions for developing MFI projects supporting rural electrification are similar to those needed to develop sustainable rural micro-finance in general: choice of lending methodology (in this case, for rural electrification credits), choice of institutional partners (which are likely to be the same selected for providing productive credits to MSBs) and minimal scale of operations required to add rural electrification credit to the MFI’s portfolio. A critical success factor in this part of the Nicaragua project would be the involvement of Genesis Empresarial, which could share its experience with and provide technical assistance to the Nicaraguan MFI selected to extend its credit lines to the rural communities and willing to broaden its portfolio to include rural electrification credits.

3. Outlook

While many issues regarding the integrated provision of rural electrification, micro-finance and business development services to remote rural areas are similar, the integration raises some important new questions that will have to be answered during project design and implementation. These questions include:

- Will integration of just a few demand-targeted services - in “cross-sector projects” - allow to overcome the coordination problems encountered in past “multi-sector projects” (e.g. the integrated rural development projects in the 70s)?
- When is bounding of different services advisable (i.e., creation of providers of multi-utilities)? When is integration sufficient? Which services should be offered separately?
- Will private sector players be interested in the potential benefits of integrated rural concessions, or do they prefer to bid for their core competence? What do they look for in a bundled tender? How to tender (one lot, separate lots) and how to compare offers? Can we propose a draft for standard bidding documents?
- What can we learn from urban multi-utilities?
- Will donors be willing to cover the higher supervision costs of cross-sectoral projects?
- Under which conditions can delivery of training and advisory services for micro and small businesses (BDS) be sustainable in rural areas? Under which conditions are ICT-based Centers sustainable? Can local MSB serve as extension agents in isolated areas?
- Are local MSBs and rural electrification providers interested in training and advisory services? Are they willing to pay to receive them? Can we devise a sustainable private-public partnership for BDS provision?
- Are local MFIs interested in broadening and diversifying their portfolios by targeting remote rural areas and introducing new lines of credits (i.e., rural electrification)?
Addressing these questions during the design and implementation of the Nicaragua Off-grid project, and of other projects linking rural electrification, micro-finance and MSB development, is essential for improving the effectiveness and the sustainability of these cross-sectors operations, and to further deepening our understanding of the synergies between these three areas.
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Annex 1
The Nicaragua Off-grid Project: summary of progress achieved to date
(status October 2001)

This section draws from the Nicaragua Off-grid Project Concept Document, currently under preparation. Please, note that this part of the paper cannot be disclosed.

1. Background

Reducing poverty in Nicaragua requires special attention to rural areas because the majority of Nicaragua’s poor live in the countryside. Improving access to electricity in those areas is key to economic growth and increased quality of life. In Nicaragua, three quarters of the rural population have no electricity service. Nationally, 40% of the total population, or about 300,000 households, are not electrified. To electrify 90% of the total population, over US $200 million would need to be invested. The Government aims at reaching this objective by 2012.

About half of the total unserved households can be reached through grid extension, which is done best through the existing and new private distribution companies. However, the majority of households in rural areas are too far away from the existing grid and/or too dispersed to allow for economically viable grid extension. For those households, off-grid electrification is a solution.

As an integral part of Nicaragua’s national rural electrification strategy which is currently being formulated by CNE, Bank support has been requested on the design and implementation of innovative, private-sector led off-grid electricity service provision models that would provide sustainable solutions for these off-grid users and serve as a key element in the formulation and implementation of a consistent off-grid electrification strategy.

Off-grid electrification in Nicaragua today consists mainly of installing a few diesel mini-grids to serve concentrated customers in remote rural areas. Most of these operate at a loss at current tariffs, and receive operational subsidies. ENEL (Empresa Nicaraguense de Electricidad), is currently in charge of supplying energy to the areas located outside the privatized concessions, via the department of isolated systems (“Sistemas Aislados”). ENEL is operating 32 diesel plants located outside the privatized concession area (19 in RAAN, 6 in RAAS, 6 in The Northern area, 1 in the Southern area), generating some 19,330 MWh per year of electricity and serving between 10,000 to 12,500 users. 38% of the plants managed by ENEL are operated between 16 and 24 hours per day, 62% between 4 and 8 hours per day. Tariffs ranged between 1.8 and 7.8 C$/KWh during the last quarter of 2000, the national average being C$3.15. Electricity sales vary greatly from one site to the other, according to the capacity to pay and the hours of service available. Sales vary from 2.79 KW/month in Layasiksa (RAAN) to 217 KW/month in Puerto Cabeza (RAAN). However average electricity sales are homogenous for RAAN and RAAS – respectively 31.80 and 31.82 KWh/month per user – and a little bit higher in the Region North of the Country 37.99 KWh/month (in El Cua, located in this Region, energy sales reached 37.99 KWh/month per user in 2000). The role of ENEL after privatization is still undefined, as are the rules for transfer of ENEL’s stranded assets in village minigrids to new operators. In El Ayote, a dealer based in Managua has installed about 80 Solar Home Systems, mostly 75Wp systems at an installed cost of about US$ 850 each.

The planned project would contribute directly to all three focus themes of the Country Assistance Strategy for Nicaragua: i) consolidating growth through private sector development; ii) developing the rural sector and strengthening environmental protection; and iii) developing human capital and protecting the poor.
2. The three pilot sites for off-grid electrification identified (and other possible sites)

- El Ayote, a boisterous municipal seat of approximately 17,000 inhabitants in the Región Autónoma del Atlántico Sur (RAAS). Located 50 km away from the grid, it has become a bustling center with a variety of economic activities (cattle raising, milk production, commercial markets). Electricity for these activities is supplied by small individual gasoline or diesel generators, and there are approximately eighty Solar Home Systems installed in the area.

- “El Bote/El Cuá”, which consist of several communities in the municipality of El Cuá – Bocay, in the department of Jinotega. The population of El Cuá – Bocay is approximately 16,000 inhabitants, including very dispersed settlements. The total population in the town nucleus is around 5,000 (3,500 in El Cuá, the rest in Bocay). El Cuá has a diesel-based mini-grid (two generators of 98 kW and 88 kW installed in 1999, servicing 450 homes). Near the locality of El Bote (Bocay) the construction of a 450 to 900 kW mini-hydropower has been initiated by a local NGO as a substitute to the diesel generators.

- La Unión, a community of about 17,000 inhabitants located 38 km from the town of Nueva Guinea in RAAS. It is less organized than El Ayote, but has also become a commercial center for neighboring communities. It has no gasoline or diesel generators but many households use automobile batteries to watch television.

In addition to these three pilot sites, about four to six additional sites will be identified during the next phase of project preparation, based on their socio-economic characteristics, potential development impact, and suitability for future replication on a larger scale. One main area of focus for this next step will be the Atlantic Zone, which will most likely ask for different service models than RAAS and Jinotega due to a higher percentage of dispersed households and the highest fuel transport costs. The planned project would split its physical investment into two phases, the first covering about 3 to 4 sites, and the second covering the remainder. The total investment would electrify about 17,000 households, 250 public centers (schools, etc) and 250 productive uses.

3. Progress achieved to date

To initialize early project preparation, the Nicaragua team has (i) conducted a demand survey for the three selected pilot sites (including a survey of 344 households and interviews), (ii) identified alternatives for locally adopted off-grid electricity service provision models, (iii) carried out a cash-flow analysis for preliminary business plans - to determine the range of subsidy levels needed for various supply targets, (iv) carried out an analysis of the national micro-finance industry and identified possible micro-finance provision models, (v) identified a technical assistance plan for MSB development and (vi) proposed a Rural Business Center model which will pay special attention to the potential of low-cost ICT-based solutions for rural areas.

During several missions, the team has organized stakeholder meetings with and between energy, BDS and micro-finance providers and has visited several potential pilot sites. The team has also organized a workshop on off-grid electricity service provision and conducted desktop studies on international experiences and best practices in the provision of the three services (summarized in the paper).

3.1 Demand survey

The demand survey conducted on the three already identified pilot sites has assessed the households’ willingness to pay for electricity and has identified the types and status of local MSBs. The main findings of the study are described below.

The average current non-cooking energy expenditures (which determines the minimum capacity to pay for electricity service) found for the three pilot sites are US$ 4.9 (El Cuá), US$ 6.65 (El Ayote) and US$ 4.77 (La Unión) per month. Based on international experience from similar projects, the willingness to pay can be estimated between 120% to 130% of this. This is enough to cover all M&O
costs for SHS, and part of the investment costs. However, is not enough for covering the managerial and operating (M&O) costs of diesel generation in these three areas. The distribution of willingness to pay determines the amounts of subsidies needed to reach a given target for local market penetration. In areas with existing electricity service (e.g. El Cuá), tariff history has a strong effect on the willingness to pay for future service levels. The average monthly household incomes (at average 6.5 household members) are estimated at US$ 270 (Cuá), US$ 500 (Ayote) and US$ 203 (Unión).

In all municipalities, the active population is mainly employed in the agriculture and livestock fields – 69% in El Ayote, 84% in El Bote-Cua and 77% in Nueva Guinea. In El Ayote and Nueva Guinea, the main source of income is the production and sale of milk, eggs and other animal products, while in El Bote-Cua, earnings come predominantly from crop sales.

A number of households are involved in manufacturing and commercial activities, often in addition to and in conjunction with their agricultural work. In El Ayote, there are 555 household businesses, 366 of which (67%) are involved in wholesale and retail commerce, and 92 (17%) in manufacturing. In addition, there are about 46 restaurants, bars and other food selling establishments (8% of all business activities). Of the 195 household businesses in Nueva Guinea, 113 (58%) operate in retail commerce, while the rest are equally split among wholesale, manufacturing and community services. Finally, of the 94 household businesses in Cua-Bocay, 39 (41%) operate in wholesale, and 34 in retail commerce and manufacturing (18% in each field).

According to the results of a market survey, lack of access to new markets (i.e., low demand and low prices in the actual markets) is the most challenging problem that the household businesses are facing, followed by lack of access to credit.

For 65% of the businesses in El Bote-Cua, 46% of those in El Ayote and 41% of those in Nueva Guinea, access to new markets is a high priority. In addition, 60% of the businesses in El Bote-Cua, 25% in Nueva Guinea and 14% in El Ayote are in need of more access to credit.

### 3.2 Draft business models for off-grid electrification

Two of the three sites have been selected for case studies on the preliminary design of locally adopted business plans that would serve as a basis for (i) pilot project development and (ii) later replication of the models in other sites. The sites are: El Ayote and El Cuá-Bocay. In spite of the higher capacities to pay in El Ayote, El Cuá shows a potential for deeper market penetration at given subsidies, because of relatively lower energy generation costs due to a low-cost mini-hydro site close by.

The draft business models that have been selected are: (i) for El Cuá an existing local Energy-Coop operating both the hydro-minigrid and SHS for dispersed users, allowing for economies of scale and optional cross-subsidies between the two user groups; and (ii) for El Ayote a new local multi-service-Coop or ESCO operating the existing diesel-minigrid (and potentially including a future hydro-generation), plus separate licensed dealers providing SHS services to the dispersed households with short term micro-finance and under guarantee of M&O for the first 5 years (this avoids the crowding-out of an existing local entrepreneur that has already installed about 80 SHS in El Ayote). There are two interested candidates for the El Ayote minigrid.

### 3.3 Cash flow analysis for the off-grid energy suppliers

Cash-flow analysis for the preliminary business plan for El Cuá shows a positive NPV for the combined concession at a monthly minigrid tariff of US$ 0.20, a user down-payment of US$ 100, and concessional financing at 8% for the hydro investment. The El Ayote business model depends highly on the cost of an optional future run-of-the-river hydro-generator (at 12 km distance) and requires relatively high tariffs (or high subsidies). In both cases, it is recommended to offer various low-end electricity service levels (e.g. SHS below 50Wp and battery charging stations that would use the excess energy of a hydro generator in off-peak times), optionally combined with targeted subsidies, to match the stratification in willingness to pay and come closer to near universal service.
Recent initiatives taken by ENEL and INE in the first quarter of 2001 (installation of a new diesel-minigrid in El Ayote, and award of a concession contract in El Cua –Bocay with a predetermined low tariff) will have a direct impact on the structure of future pilot projects, by limiting the spectrum of possible delivery mechanisms and tariff schemes for the pilot projects planned by CNE. There is a need for reinforced communication and coordination between the three entities for the success of a sustainable off-grid program.

3.4 The national micro-finance industry and the proposed micro-finance model

Nicaragua has a well-developed and competitive set of institutions, led by ACODEP, Fama, Finca Nicaragua, Confía, La Caruna, and FDL Nitlapan. There are four key characteristics of the national industry: (i) individual lending methodologies predominate, (ii) agricultural credit represents a significant share of the loan portfolios, (iii) the market is credit constrained and micro-finance institutions cannot respond to demand, and (iv) the transformation process from a non-government organization to a regulated financial institution has begun (led by Confía). However, there are large parts of the country with little or no micro-finance institution outreach. Also, with a few exceptions, micro-finance institutions provide only short term working capital and seem reluctant to expand their product lines to include innovative products.

Currently, the industry is facing several key challenges, related to the lack of a clear and supportive legal and regulatory framework, the fact that accessible commercially priced funds are tight, that transformation process from non-government organizations to regulated financial institutions is difficult (especially for MFIs serving rural areas) and that donor support to micro-finance in the country has recently decreased. To address legal and regulatory framework needs, leading MFIs have formed the Asociacion de Microfinanzas de Nicaragua - ASOMIF. This small representative body has become active in advocacy and has sponsored industry-wide seminars and exchanges.

The micro-finance component of the project would provide access to short term working capital to existing businesses, investment capital to new businesses and to those businesses prepared to expand operations significantly, and savings facilities to all households, through a private sector-led business model. The business model would be either based on a credit union/village banking combination, or on individual methodologies with light collateral and cash-flow based client selection, and/or solidarity groups with joint liability. The choice of the final alternative for the micro-finance business model is still open and will be determined based on local conditions through a PHRD grant-financed consultancy. Potential consultants would be ACODEP of Nicaragua and Genesis Empresarial of Guatemala, with a small support role by ASOMIF. The leading MFI in Nicaragua (ACODEP) has already received initial training from a USAID-sponsored consultant in rural electricity financing. There is no planned USAID follow-up, and ACODEP is eager to expand both its products and geographic coverage.

According to the village banking alternative that would be supported by the project, Village Banks would become members of the credit union. This will enable rural households to save in a secure and sound institution, and receive a reasonable return on savings. The village bank would handle the working capital credit needs of its members, using capital from the credit union and providing a joint liability guarantee. La Caruna, a large credit union movement, which has branches in most parts of the country, would be a possible financial institution to take on this role in RAAS and RAAN. This model could serve thriving rural market settlements (such as El Ayote), but could also be tailored to efficiently serve the financial needs of a smaller town (such as El Cua) from a nearby more developed town. With support from the project, the local credit union branches could be provided with a line of commercially priced credit (progressively larger but linked to accumulated member savings, member shares and retained earnings of the local branch) and a technical assistance package.
3.5 Plan for provision of BDS to MSBs

There are about twenty large BDS providers in Nicaragua, five of which are working in rural areas. Technoserve, APENN and UNIDO are among the most developed organizations, operating mainly in the north and north east of Nicaragua and providing specific training courses to rural entrepreneurs. Technoserve and APENN are particularly interested in expanding their services to rural areas that are being electrified.

The Nicaraguan Government is strengthening rural businesses and enhancing their links to the productive industry. Initiatives in these areas are promoted by the Ministry of Agriculture (MAGFOR) and the Ministry of Industry (MIFIC) and are often funded by donor organizations. The Government’s efforts are mainly aimed at: (i) upgrading agricultural technology, (ii) creating vertical and horizontal clusters\textsuperscript{10} by linking farmers and businesses operating in similar, related or complementary industries (e.g., the World Bank competitiveness projects and UNIDO are supporting the development of linkages between rural and urban entrepreneurs in the diary cluster), (iii) increasing farmers’ access to rural telephony, to computers and the internet, and (iv) training trainers to expand BDS delivery to MSBs located in rural areas.

During the project’s implementation phase, the Nicaragua team will explore possibilities of working with UNIDO to support clusters’ development and will discuss with APENN and Technoserve the possibility to provide training in the pilot sites. The three organizations could also be involved in the development of online local content, which constitute a key step for the implementation of ICT-based Rural Business Centers (see below).

Training courses for farmers and rural MSBs would focus on: (i) planning and budgeting, (ii) marketing and sales, (iii) basic financial and managerial accounting, (iv) production and quality improvement, (v) inventory management and supply chain management. The technical assistance will also entail helping farmers to create cooperatives, rural commercial and to establish and strengthen links to other farmers and businesses belonging to their clusters.

3.6 Rural Business Centers

The team would assess the potential for extending ICT-based services in the remote rural target areas of the project. For a sustainable ICT-based BDS provision to remote areas, it will be crucial to match both content and tools to the specific needs and willingness to pay of the rural MSBs.

As one alternative, about four main ICT-based Business Centers would be created and linked through ICT solutions and/or extension agents to remote areas. The Business Centers might be located in La Dalia (with outreach services to El Cua and El Bote), El Ayote, La Reunion and in one additional location – final siting depending on the specific local demand. Initial total capital costs for such a network are estimated at under US$ one million, of which about less than half would cover the physical investment for the Centers and the rest would finance the development and updating of online local content suited for rural areas, staff and management skills training, technical support for the ICT network, quality assurance, and a client voucher program to increase the awareness of and promote business development services and ICT. Depending on the results of project preparation regarding the rural service demand, the ICT-based part of the Business Centers could provide farmers and rural MSBs with (i) access to phone, fax and computer, (ii) ICT applications adapted to their business needs (e.g., software tools for simplified business planning, accounting, marketing); (iii)

\textsuperscript{10} Clusters are “geographically bounded concentration of similar, related or complementary businesses, with active channels for business transactions, communications and dialogue, that share specialized infrastructure, labor markets and services, and that are faced with common opportunities and threats.” (Rosenfeld, 1997; see also Porter, 1990). Vertical clusters are made up of industries that are linked through buyer-seller relationships. Horizontal clusters include industries which might share a common market for the end products, use a common technology or labor force skills, or require similar natural resources (Porter 1990).
basic ICT training and business training and (iv) internet access at least in one or two Centers. As mentioned above, APENN, Technoserve and business associations could be involved in the development of online local content, including information on the industries in which rural MSBs and farmers operate and information on the pilot sites, to ensure that local farmers and MSBs find relevant online information when connecting to the worldwide web. An important goal of the Business Centers would be to aim at a positive overall rate of return through sound service pricing and maximum cost efficiency of operations. To accomplish this, service prices to be paid by clients could be set to fully cover direct delivery costs. (These are expected to be affordable for MSBs, amounting to an estimated 1% of their sales.) At the same time, the development and updating of online local content, the adaptation of hardware and software, and part of the skills training costs would be supported by the Bank loan (due to the experimental nature of these activities and to the positive externalities related to them.)