

An institutional model for rural services

A. Phongsavath and A. Harvey, Lao PDR

In areas where no transmission lines are expected, the organization of affordable and reliable domestic electricity is a major challenge. To address this, an institutional model has been piloted in Lao PDR. The model may be relevant to the water sector, since there is scope for integration of water and electricity services in rural areas. A key feature of the model is that it establishes an incentives framework which attracts private-sector participation in reaching large numbers of villages, while also rewarding long-term reliable delivery of service. The financing mechanism motivates villagers to take care of equipment. On the national level, the model includes facility for self-finance, and so continuously delivers reliable service independently of project funding cycles.

Background

Provision of rural electrification is one of the goals of the National Growth and Poverty Eradication Strategy endorsed by the National Assembly of Lao PDR in January 2004. The Power Sector Policy Statement and its action plan issued by the MIH in 2003, identifies expansion of off-grid rural electrification as a route toward socio-economic benefits and improved rural incomes. The Statement calls for a partnership approach, with private sector bodies providing off-grid electricity services, while local authorities and other government bodies provide regulation and assistance.

The Government of Lao PDR plans to connect most rural households to main grid transmission lines over the next fifteen years. Since the cost of grid connection is prohibitively high in some remote areas, MIH also proposes that some 10% to 15% of the population (between 100,000 and 150,000 households) receive improved forms of off-grid supply.

Improved services

Ad hoc solutions to rural electricity supply exist everywhere on a household-by-household basis, as in the use of small private hydro generators powered by local irrigation channels and rivers, or in cases where an entrepreneur charges batteries or connects wires from a private diesel generator to several houses.

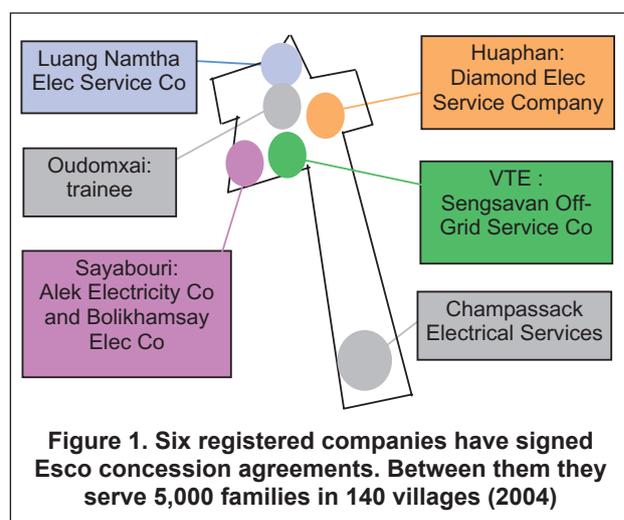
These kinds of solutions are generally expensive, unsafe, unreliable, or available only seasonally. Expenditure by villagers is often in the order of \$2 per month or more. Poorer households relying on non-electrical lighting from wick-lamps, typically spend more than \$1 per month on fuel, and receive a very inadequate standard of illumination.

Improved lighting in rural houses is generally considered a major step forward in quality of life. It stimulates better health practice (use of mosquito nets, hygiene), increased opportunities for education, and evening income-generating

activities. Use of radios and TVs is often considered a step forward in terms of increased knowledge and motivation. Day-time electricity supply gives rise to a greater range of income generating opportunities. In general, reliable and better-quality electricity services are in strong demand from rural people.

Incentives for service companies

The MIH strategy is to develop an effective partnership between government bodies and private sector service companies. To reach 150,000 people in the next fifteen years implies 10,000 connections per year. It is quite realistic to envision several national, regional or provincial service companies sharing this task amongst them. Currently six provincial companies are active (Fig 1). These operate under an incentive system focused on the quality of the services provided, specifically the reliability of the supplies in each household over a ten, twenty (or more) year period following



the connection. This focus on long-term quality of service is supplemented by incentives for expansion of the number of connections.

Performance to date

A rapid expansion of volume of service in remote areas carries a high risk of failure of reliability. To protect against this, we have developed a delivery mechanism with the following features:

- User choice
- Technical back-up, parts supply network
- Mediation and regulation through tri-partite contracts
- Ownership incentive
- Performance rebates for service providers and mediator

By adopting these features we have achieved in the past three years a high reliability record, with no payment defaults and 3% late payment status.

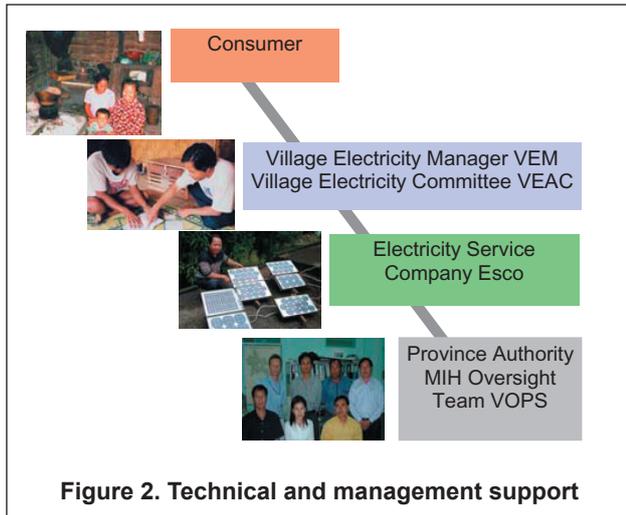


Figure 2. Technical and management support

The user is a chooser

As a general rule of thumb participation by users in planning operations is an essential basis for later sustainability. Escos follow a procedure within each village whereby technology options and energy resources are surveyed, followed by meetings to discuss each option. The procedure includes careful identification by villagers of a suitable individual to act as a Village Electricity Manager (VEM), the establishment of a mediating committee (VEAC), and the contracting of families into financing and service agreements. The user is a chooser in another sense also, with individual households deciding their preferred level of service. In the case of Village Stations (such as a hydro generator), each family registers for a certain number of units of supply, and in the case of Household Systems (such as solar home systems) they opt for different capacities. A one-size-fits-all policy, which has been tried in many countries, is rarely effective.

Support chain

Reliability depends also on how effectively the user is supported with guidance and technical back-up services. As shown in figure 2, these are provided by the private sector players, the Village Electricity Manager, the provincial Escos, and in some cases a regional or national Escos acting as an umbrella for provincial Escos. The Village Off-Grid Support and Promotion Office (VOPS) provides guidance and technical support to the Escos. This back-up is not focused purely on hardware maintenance, repair, warranty provision, and spare parts supply. It also back-stops the financial administration and management capacity of Escos and VEMs.

The public-private partnership

The effectiveness of technical and management support depends on the existence of a linked set of clear agreements and procedures. Figure 3 shows that contracts are signed between private sector implementers together with a third party, the government regulator and mediation body. Responsibilities are defined in these agreements; for example, the staff of the Provincial Department of Industry and Handicraft (PDIH) have the key role of inspecting and certifying the technical standard of installation work carried out by a VEM and Escos – this is a regulating role. The Village Electricity Advisory Committee (VEAC) has the role of supporting the VEM in his tasks of revenue collection; it promotes income-generating applications, provides short-term loans to families in difficulty, and resolves disputes – the VEAC is a mediating body.

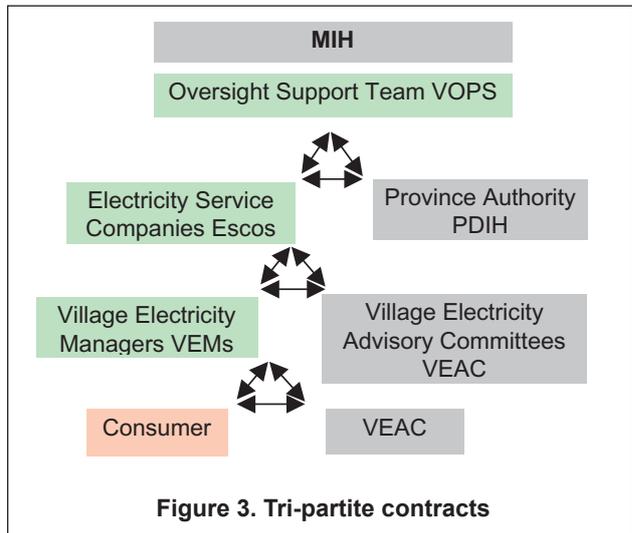


Figure 3. Tri-partite contracts

Escos activity is licensed and regulated by VOPS and the PDIH offices, who have responsibility to demarcate grid and off-grid areas, and approve plans. VOPS provides co-ordination and oversight on behalf of MIH. It progressively improves the regulatory framework, ensures fair competition to promote efficient Escos practices, provides training and technical support to Escos, prepares the tri-partite contracts

in Figure 3, and oversees their implementation. It works as an implementing arm for the MIH program management staff and for the Off-Grid Fund Committee (Fig 4). In many respects VOPS is a streamlined hybrid public-private organization with no more than 4 or 5 consulting staff, responding a growing volume of work by continuously outsourcing elements of role to regional or national Escos. One important aspect of its role is that it works closely with the PDIH offices progressively strengthening their role with a view to eventual adoption of most aspects of the program by provincial governments.

Technologies

The institutional model described here is effective for many village technologies. For example an Esco can introduce a solar or diesel powered borehole pump, and arrange for its management by a VEM using the hire-purchase financing model described below. A village hydro is often combined with irrigation channels and clean water piping. In general we classify schemes of this sort as Village Stations to distinguish them from Household Systems or technologies involving installation of hardware for individual family use Examples could be a family rain catchment tank, purifier, or water supply pipe – conceivably these could be organized in a manner similar to that described here for solar home systems.

Financing models

In the case of solar home system (SHS) dissemination, the contractual arrangements mentioned above are open to either

rental (“fee-for-service”) or hire-purchase (“rent-to-buy”) financing models. Under fee-for-service, the consumer pays monthly fees for use of electricity generated by installed equipment, while a provincial or national company maintains the equipment at no extra cost to the consumer. Hire-purchase involves two phases. The first is a rental period in which maintenance support is provided on less favorable terms - spare parts and expertise for repairs are available in the village on the basis of a Village Electricity Manager earning a portion of rental payments, but the user must pay the costs of repairs after a warranty period has expired. The second phase is ownership; if all rental payments are made, the user becomes an owner. He is not left without expert support, as the VEM is still available to do repairs and supply spare parts, having by then established an income from this work.

Under the MIH program design only minor modifications to paper work are needed to allow Escos, VEMs, and users to choose one or other of these systems, and it is possible for rental to be applied in some areas and rent-to-buy in others. This variegated approach may occur in future years, if for instance rental is found to be a valid method of reaching more remote or more cash-poor villages.

Comparing the models

During field trials of SHS in 1999 and 2000 service fees were found to have significant risk of unreliability. The customers would sometimes announce their intention to refuse fees due to situations such as temporary absence of the trained service technician or some form of dissatisfaction with service. It became apparent that frequent refusals could become a norm. In contrast the pilot trails indicated strongly that users were happy with payments leading over 5 or 10 years to ownership

In general for SHS, fee-for-service can result in careless handling and deterioration of equipment, since users carry little responsibility for repair.

On the other hand the incentive of prospective or actual ownership by villagers is simple and effective in ensuring equipment is looked after. Village station managers appre-



Photo 1. Village hydro systems are usually integrated with irrigation channels and clean water supply



Photo 2. Solar home systems are popular in Laos. Sizes available under the MIH program are 20W, 30W, 40W and 50W.

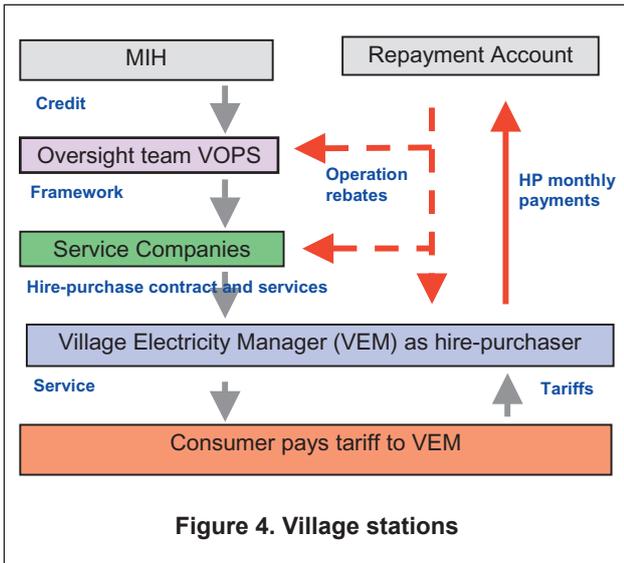


Figure 4. Village stations

ciate the need to maintain the hardware in good working order as their income depends on it. Equally, a SHS owner (prospective or actual) is concerned to maintain the asset of a durable solar panel in good condition both as sale-able asset and as a source of electricity.

The dissemination of SHS panels ownership to rural families strengthens their economic security, since they can use the resale value of their panel as protection against financial emergencies. Indeed the rent-to-buy or hire-purchase model acts as important poverty-alleviation mechanism in this regard.

Tariff with HP

When applied to Village Stations, the two models are combined. In this case the VEM obtains the equipment by hire-

purchase, while he is covering his costs through collection of tariff payments (or fees-for-service) from his customers. Figure 4 illustrates this arrangement. Household systems are organized a little differently, with hire-purchase repayments coming from the consumers themselves.

National price guidelines

A key feature of MIH’s role in disseminating off-grid electricity service is that it is promulgating nationally a simple pricing guideline for both Village Stations and Household systems. An example is given for SHS on Table 1 where down-payments and monthly payments are listed. Although this raises questions about affordability in specially cash-poor areas, it does have the effect of eliciting a consensus for good behavior; if everyone is paying the same, there is not much excuse for defaulting. This discipline is enhanced by setting the hire-purchase price to reflect the nominal face-value of the hardware procurement, delivery and commissioning cost (for example in the 30 watt case, the consumer can see he is paying about \$200 for equipment costing about \$200). Although the customer may be aware this is artificial in being free of interest and of commercial mark-ups, it is nevertheless a proper purchase from a commercial company at a proper price, rather than a hand-out. This engenders pride on the part of the consumer and discipline in satisfying the commercial company’s payment expectations. It is likely that we will find that the prices set at present will not be affordable for more than about 70% of the rural population, so a question will be raised as to reaching the final 30%. Our prices approximately reflect current expenditure on electricity by about 50% of the rural population on electricity (pico-hydros, battery charging, purchase of dry cells). One question in the

Table 1. Approximate SHS prices and face-value subsidies (kip represented as dollars)

		10W	20W	30W	40W	50W
Cost	Commissioning cost (hardware cost, planning and post-installation rebates)	78	137	195	253	311
	Operational rebates over 10 years	84	84	84	84	84
	Approx replacement parts over 10 years	100	100	100	100	100
	Total cost	262	321	379	437	495
Consumer pays	Down-payment	13	16	19	22	25
	Hire-purchase dues per month	0.5	1	1.5	2	2.5
	Hire-purchase payments over 10 years	60	120	180	240	300
	Approx replacement parts over 10 years	100	100	100	100	100
	Total consumer payment	173	236	299	362	425
Subsidy	Shortfall	89	85	80	75	70
	Percentage face-value subsidy	34%	26%	21%	17%	14%

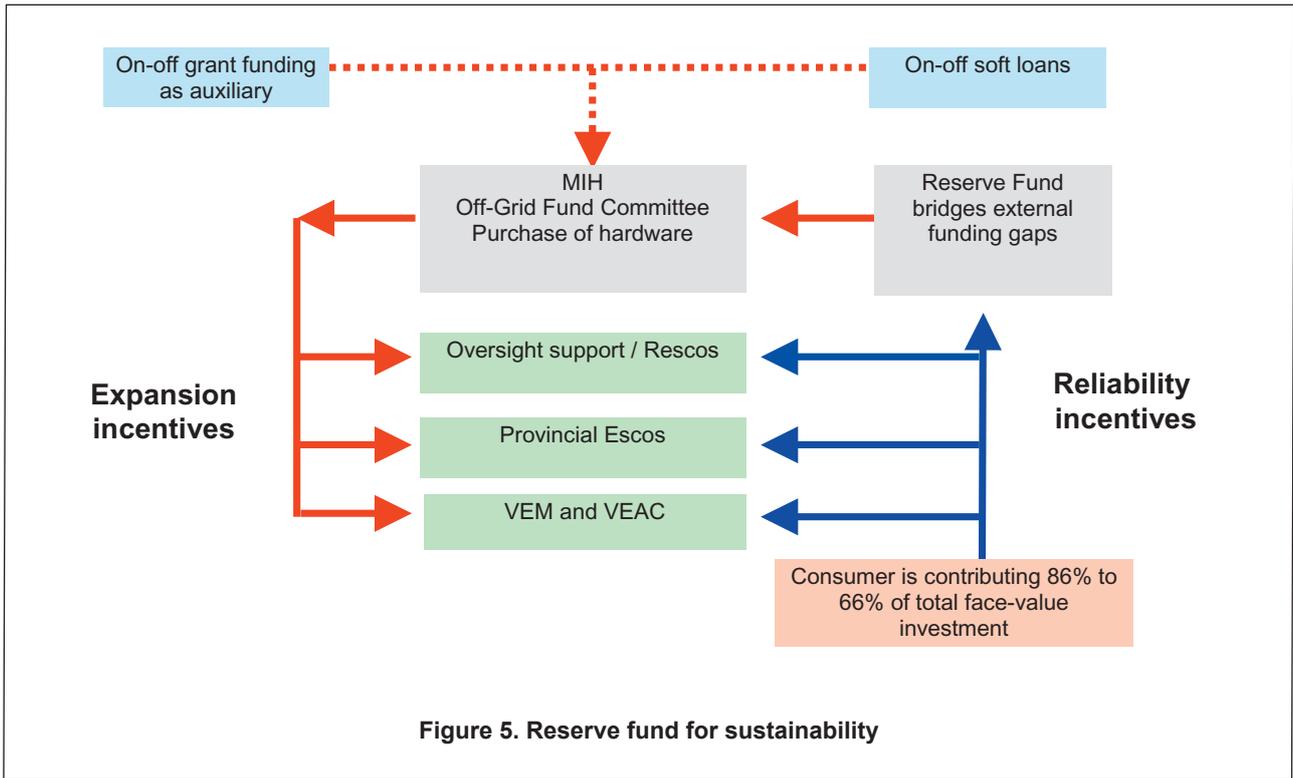


Figure 5. Reserve fund for sustainability

future will be, would increased subsidies in special areas or for the most marginalized members of a village, lead to dissatisfaction by mainstream consumers. It will probably be important to maintain a national price guideline which is followed by everyone, and make adjustments in other variables. This may be possible through new techniques such as introduction of income-generation and electricity packages, or possibly water and electricity packages.

Expansion incentives

Many rural services involve installation of expensive hardware in remote villages; water pumps, pipes, purifiers, electricity generators are examples. If the hardware is to work properly over many years, expensive travel by experts to each village is needed, to match design specifications to local conditions, to set up adequate organizational capacity, and to install equipment correctly.

The program prescribes procedures for Escos to follow when they make initial planning visits in which systems are set up, and electricity consumers registered. To encourage the Escos to apply these proficiently, a payment is made by VOPS for each consumer registered, on receipt of Cluster Plans if the plans demonstrate full compliance with procedure for a group of villages. This planning rebate is considered one of the Commissioning Costs of the rural service. In principle it is withdrawn once the Esco gathers sufficient customers and financial reserves to allow it to submit correct planning documents as its own investment.

The test of the quality of the planning, installation, and organizational set-up is not immediate but many months after installation. The MIH program offers Escos a “post-

installation” rebate which is paid pro-rata to the number of working service connections, on condition of full and accurate reporting of conditions within the village during the first six months after installation. The Escos also receive a smaller rebate on consumer payments made at time of installation.



Photo 3. Costs of an improved service are reduced by linkage to income generation

A brief summary of the main expansion incentives includes:

- Planning rebate (withdrawn once the Esco is large)
- Installation and post-installation rebates
- Parts supply margins

VEMs also benefit from post-installation rebates, to make sure that in the first six months they are motivated to follow procedures and adopt good practice. Expansion rebates may be applied in the future as performance incentives for VOPS.

Reliability incentives

The various incentives for sound operation so far discussed are user choice, technical and management support, mediation and regulation through tri-partite contracts, and prospective and actual ownership. A further reliability incentive is built into the MIH delivery mechanism: the operational rebate, as shown on Fig 4.

For each hire-purchase repayment correctly deposited in the government's cost recovery account, the VEAC, VEM, and Esco can claim a rebate sum. This means that good planning (good choice of VEM), good installation, good customer relations, good mediation, preventive maintenance practices, advance stocking of spare parts, good training of implementers, and any techniques aimed at reliable electricity supply, are rewarded. This principle is to be extended to administrative cost rebates for PDIH offices, and for performance linking the remuneration of VOPs.

Figure 5 shows how the bodies engaged in off-grid delivery are motivated by both expansion and reliability incentives, amongst which are the rebates. The question as to whether reliability can be maintained as the program seeks to up-scale to 10,000 connections a year is still open; clearly the development banks and aid agencies must be convinced of this if larger inflows of soft credit or grants are to be available. The figure helps by showing an anatomy of the mechanism, and reminding the regulators that any increase in expansion rates must be balanced by a health-check on reliability. As time goes on increasing attention will need to be paid to practical application of the mechanisms assuring reliability.

Sustainability

For rural services to work every day, the support structure must be financed every day. This means in our case the VEM, VEAC, Esco, and oversight team VOPS, must have a secure source of income. Revenues from users are regular and easily accessible. Figure 4 shows these are used to fund the operational rebates, but these rebates will not by

themselves keep the players in business for more than a few months. Clearly expansion is necessary to keep the players on the field and this is mainly funded by soft loan. The difficulty is that loans and project cycles stop and start, as indicated by the dotted lines in Figure 5. One solution is for the government to define its own continuous program. It would then attract finance packages from different sources and arrange their timing to overlap so that the net effect is a continuous inflow.

Another solution is to develop internal reserve funds which are used to immediately fill gaps appearing between external project cycles and soft credit tranches. In Figure 5, it is clear that funds in the reserve can be triggered into action at any time that external funding inflow suffers a dip.

MIH is adopting both the above approaches for the village off-grid program, and is now instituting an Off-Grid Promotion Fund (OPF) to accumulate finance and to act as a focus for effective governance of the program. This fund is expected to evolve into a wider Rural Electrification Fund in due course.

From the point of view of Escos, an exclusive concentration on electricity services as such is not necessarily the best thing. Diversification into a range of rural services, including water services, promises a rationalization of costs.

References

- National Growth and Poverty Eradication Study*, Vientiane, Lao PDR
Ministry of Industry and Handicraft (May 2003) *Power Sector Policy Implementation Strategy and Statement*, Vientiane Lao PDR

Contact addresses

Mr Anousak Phongsavath
Deputy Director of the Division of Rural Electricity
Department of Electricity, Ministry of Industry and Handicraft, Nong Bone Rd, Vientiane, Lao PDR
Tel/fax 856 21 415714
solarred@laotel.com

Dr Adam Harvey
Adviser to the Off-Grid Program of MIH
Off-Grid Promotion and Support Office (OPS)
POBox 9020, Vientiane, Lao PDR
Tel 856 20 5615488
adamharvey@compuserve.com
