The Government of Nepal
Ministry of Energy, Water Resources and Irrigation
Alternative Energy Promotion Centre (AEPC)
Making Renewable Energy Mainstream Supply in Nepal

giz Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH

GUIDELINE FOR MANAGEMENT AND OPERATION OF COMMUNITY MANAGED SOLAR MINI-GRIDS

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In collaboration with
Ministry of Physical Infrastructure Development (MoPID)
Sudurpaschim Province
Nepal

June 2023

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Preamble

Under the mandate given through the Constitution of Nepal, the Ministry of Physical Infrastructure Development, Sudurpaschim Province, has initiated and supported the development of this guideline in consultation with users, AEPC, local governments and sector experts to help guide the user's organizations/cooperatives, local governments and stakeholders of solar mini-grid projects.

BACKGROUND

Alternative Energy Promotion Centre and Sudurpaschim Province are investing heavily in the development of solar mini-grids at locations outside the reach of the national grid inside the province. However, sustained management and operation of these systems are not often addressed. It was realized that the solar mini-grids (SMGs) installed to date are running in poor conditions due to a lack of guidance on various management aspects including tariff setting and collection mechanism and utilisation of revenue for operation and maintenance, and productive use of energy. These inadequacies have led to weak management of the system within the community. As a result, the sustainability of SMGs has been jeopardised. Similarly, the hand-over/takeover processes are not properly documented and are lacking information on appropriate operation and ownership mechanisms.

To enhance the reliability and sustainability of the installed SMGs, it has become imperative to determine the rights, obligations, and responsibilities of the responsible organization (users organization or cooperative) that is directly involved in daily management and operation. This feat can only be achieved when there exists active community participation, with the people having practical knowledge & skills on how to manage and maintain such SMGs systematically. It is also necessary to increase common responsibilities among stakeholders, local government, and provincial government to take guardianship of such systems. These realizations require the development of a simple, practical, implementable management and operation guideline that is acceptable to users, stakeholders, and government agencies.

Thus, the main purpose of this guideline is to strengthen the ability of user organizations and cooperatives so that they can effectively manage and operate SMGs. More specifically, this guideline aids in ensuring the sustainability and attractiveness of SMGs by addressing issues of governance, accountability, and transparency. Furthermore, the guideline has attempted to incorporate management aspects that are not adequately described in government-issued procedures such as User Committee Formation, Management and Operation Procedure, 2075 B.S. and Solar Mini-Grid O&M Guideline developed by AEPC/RERL.

FOREWORD

By Executive Director of AEPC

Rural electrification through decentralized mini-grid systems has been becoming popular in the far remote communities of Nepal and other developing countries. Even some developed countries have started promoting renewable energy-based decentralized mini-grid systems as it is much more expensive to supply reliable electricity services through the central grid. The Government of Nepal (GoN), government agencies dedicated to rural electrification, development partners, Provincial Governments and local bodies have invested heavily to increase basic electricity access using solar PV technologies to the communities residing in the country's remote areas.

Alternative Energy Promotion Centre (AEPC) is partnering with government agencies, development partners, Provincial Governments, local levels, private sector, user groups, and other concerned stakeholders for providing electricity services to people outside the reach pf the national grid through solar mini-grid systems. Such solar mini-grid systems which are funded by the supporting agencies (in most cases AEPC and the development partners) and installed by private companies, will be handed over to local user organizations after the completion of construction work. These local organizations (community groups/ users organization/ cooperatives) manage and operate the projects after successful testing and commissioning. However, due to a lack of technical knowledge and management capacity in local user organizations/committees or cooperative organizations, many projects are not able to perform sustainably.

The Ministry of Physical Infrastructure Development (MoPID), Sudurpaschim Province has been developing some solar mini-grid projects with its investment to provide electricity services to the remote villages of the province. Similarly, AEPC together with various development partners is also providing technical and subsidy support for such technologies in the province. For sustainable management and operation of such community-based solar mini-grid projects in the province, the ministry has decided to prepare and implement the "Guideline for Management and Operation of Community Managed Solar Mini-Grids" in the fiscal year 2079-80 B.S.

The Promotion of Solar Technologies for Economic Development (POSTED) project has prepared this guideline in line with the ministry's decision and request. AEPC has approved this guideline and recommended it to MoPID to apply it to the solar mini-grid systems that are currently operating or will be built in the future in the districts under the government of Sudurpaschim Province. This guideline provides important topics ranging from the choice of suitable institutional structure (user organization or cooperative) to the management/operation of the solar mini-grid system, to the selection of employees, financial management, the operation process of the organization, tariff determination and collection, etc. In addition, the important procedures, forms, formats etc. which are necessary for the daily operation and management of the community organization are also included in the guideline.

The POSTED team was directly involved in the preparation of this guideline as per the request of MoPID, Sudurpaschim Province. I would like to express our gratitude to Mr. Felix Nitz, the Team Leader, Dr. Bharat Raj Poudel, Deputy Team Leader, and Mr. Ajay Thapa, Solar PV Specialist. I would also like to express our sincere thanks to Mr. Barun Adhikari (national expert), Mr. Muhammad Imran (international expert) who worked hard to prepare this guideline. Likewise, I would like to express gratitude to Dr. Narayan Adhikari, Director, Dr. Laxman Prasad Ghimire, Assistant Director of AEPC and the entire team of AEPC who continuously supported and provided suggestions and assistance during the preparation of this guideline.

Finally, I would also like to thank the MoPID, Sudurpaschim Province family including the then Secretary of Sudurpaschim Province Mr. Tulsi Bhattarai and the current Secretary Mr. Prem Dutt Bhatt, who coordinated with the POSTED project and supervised the preparation of this guideline. Finally, I express our sincere gratitude to the experts, employees of various offices and communities including the operators and managers of the solar mini-grid projects who participated in the discussions at various stages during the preparation of the guideline.

Nawa Raj Dhakal
Executive Director
Alternative Energy Promotion Centre

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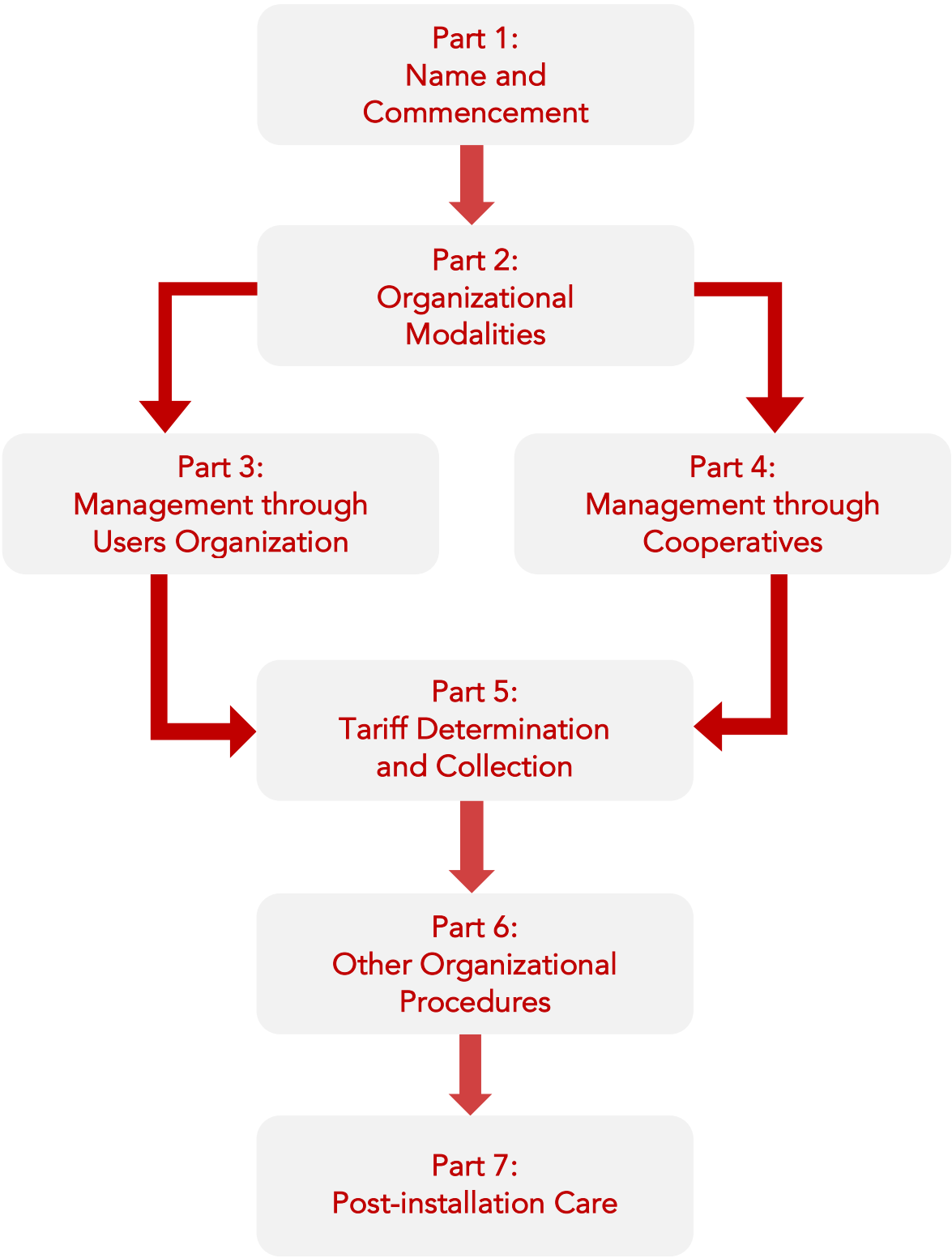
List of Abbreviations

AC	Alternating current
AEPC	Alternative Energy Promotion Centre
B.S.	Bikram Sambat
CBO	Community-based organization
FG	Federal Government
FMSC	Financial & Managerial Sub-committee
GPS	Global positioning system
HH	Households
HR	Human resources
KPI	Key performance indicator
kWh	Kilo watt hours
LG	Local Government
MC	Management Committee
MC	Multipurpose Cooperative
MDP	Main distribution panel
M&E	Monitoring and evaluation
MoPID	Ministry of Physical Infrastructure Development
MSMEs	Micro, small and medium enterprises
NEA	Nepal Electricity Authority
NGO	Non-governmental organization
M&O	Management and operation
PEU	Productive energy use
PG	Provincial Government
PV	Photovoltaic
RC	Recruitment Committee
RE	Renewable energy
RERL	Renewable Energy for Rural Livelihoods
SMGs	Solar mini-grid
SMS	Short messaging service
ToR	Terms of reference
TSC	Technical Sub-committee
UC	User's Committee
UO	User's Organization
VAT	Value added tax

Chapter Flow



PART 1
NAME AND COMMENCEMENT

1.1 Citation, application and interpretation

- The name of the guideline shall be cited as "Guideline for Management and Operation of Community Managed Solar Mini-Grids, 2023".
- This guideline shall be binding to all solar mini-grid user organizations/cooperatives, respective local governments and other stakeholders.
- The Ministry of Physical Infrastructure Development, Sudurpaschim Province shall have ultimate rights to explain this guideline.
- In case of any legal ambiguities, established laws shall be referred to for resolution.

1.2 Definition of specific terms used

"**Users**" shall mean electricity users of SMG systems.

"**Users Committee**" shall mean a management committee formed by a general assembly meeting of electricity users to implement, operate and manage an SMG.

"**User's Organization**" shall mean a formally registered User's Committee in the local government (LG) that is entitled to the Management and Operation of the SMGs. User's Organization is usually identified through its unique name given at the time of registration.

"Cooperative" shall mean a Multipurpose Cooperative registered as per the Cooperative Act 2074 that operates the Solar Mini-Grid together with other economic activities.

"Organization" shall mean the User's Organization or the Multipurpose Cooperative that is legally registered in LG/PG and entitled to the management and operation of SMGs.

"Productive Energy Use" shall mean agricultural, commercial and industrial micro, small and medium enterprises consuming SMG electricity as a direct input for the production of goods and services.

"Solar Mini-Grids" shall mean an off-grid generation of electricity from solar energy technologies with local distribution systems to end users; that are financed by local government, government agency, or a donor agency, or through multiple financing sources.

"Installer Company" shall mean a qualified (pre-qualified by AEPC) solar power company that is contracted by LG, or government agency, or an investor to supply equipment, install and provide post-installation services.

"Service Provider" shall mean a qualified solar power company contracted by an SMG Users Organization or Cooperative or LG/Provincial Government (PG) to provide specific operation and maintenance services.

"Funding Agency" shall mean government agencies, non-governmental organizations and development partners that work in partnership with LG for the development of the SMG.

PART 2 ORGANIZATIONAL MODALITIES

2.1 Modality selection

- Local government and electricity users shall carefully choose the appropriate ownership modality for the implementation, management and operation of the SMG.
- Ownership modality shall be selected based on the type of funding available, economic opportunities, community capacity, and size of the SMG.
- The LG shall duly request financial and technical support from a suitable funding agency based on the corresponding subsidy/grant policy.
- LG and the concerned community shall refer to Table 1 below which portrays general conditions for the selection of the most appropriate SMG ownership modality.

Table 1: SMG Ownership modalities and general conditions

Ownership modalities	General conditions
1. User's Organization	▪ Not feasible to set up cooperatives, companies or other prevalent ownership modalities in the community due to local contexts. ▪ Ability to fulfil all requirements to receive FG, PG and LG grants. ▪ Other government agencies or development partners prefer to provide SMG grants through User's organization modality. ▪ SMG is relatively small (capacity below 30 kWp, serves less than 30 households and potential revenue below Rs.15,000 per month).
2. New SMG-oriented cooperative	▪ Funding agencies have pre-conditions that the SMG should be implemented and managed by a cooperative. ▪ There is an opportunity to manage multiple SMGs in a single cooperative to reduce M&O costs. ▪ SMG is relatively moderate or bigger (capacity is more than 30 kWp, serves more than 30 user households and potential revenue is more than Rs.40,000 per month). ▪ PEU potential is relatively high in the locality. ▪ Community mobilization support is available from LG, NGOs, cooperative federations, or service providers.
3. Existing multipurpose cooperative (micro-finance)	▪ The existing cooperative is willing to internalize SMG components into it by forming a dedicated subcommittee of electricity users. ▪ Such a subcommittee is capable and willing to execute all M&O activities under the umbrella of a multipurpose cooperative.

Ownership modalities	General conditions
	▪ Cooperative is willing to consider this subcommittee as a shareholder on behalf of its users. ▪ The existing cooperative is willing to provide the required M&O support to the SMG.
4. Public/private company	▪ The company is registered in the Office of the Company Registrar (OCR) under the Companies Act 2063. ▪ LG aims to obtain or has secured a subsidy from the AEPC or investment from the company. ▪ The public-private partnership model has been agreed upon for the development, management and operation of the system. ▪ Exists significant MSME and economic potentials in the locality. ▪ There are more than 100 shareholders in the case of a public company. ▪ There is/are 1 to 100 shareholders in the case of a private company.
5. Local government	▪ The targeted community is too poor, deprived and has not capacity to run the SMG. ▪ Other ownership modalities are inappropriate due to specific socio-economic conditions of the community. ▪ LG aims to obtain or has secured government subsidies or LG has allocated a budget for the SMG development. ▪ LG must provide electricity to all left-out communities to cover 100% of households by 2030. ▪ Existing SMG has collapsed, and LG has to take full responsibility for its M&O.

2.2 Guiding principles

- The community shall be supported through SMGs where electricity through the national grid or mini-grid or microgrids have not been reached yet.
- Users shall be capable and committed to owning the SMG, as well as fully aware of potentially higher per unit cost compared to the national grid.
- Whatever the ownership model, the saving credit activities shall be carried out within the user's group.
- Whatever the ownership model, it shall demonstrate representative, autonomous, non-profit, voluntary, democratic, inclusive, and participatory characters in its workings.
- Whatever the ownership model, it shall have an organizational vision, goals, plans, management committees, and basic facilities such as bylaws, office, workforce, bank account, etc.
- As far as possible, public land shall be used for SMG to avoid potential social conflicts and minimize management cost.
- Agreement between community organization and installer company shall be in Nepali language.

- There should be tri-party agreement between the provincial government, local government and installer companies when the system is being implemented in support from the provincial government.
- Despite many ownership models argued above, this M&O guideline shall be applicable largely for the 'Users organization' and 'Cooperative' ownership modalities.

PART 3
MANAGEMENT THROUGH USERS ORGANIZATION

3.1 User's Organization structure

- The User's Organization (UO) shall have a User's Committee with the following positions for the overall management of the SMG:
  - Chairperson
  - Deputy Chairperson
  - Other members (7-9)
- The UO shall have the following full/part-time salaried staff:
  - System operator, and/or
  - Manager
  - The UO can optionally engage a third-party service provider for specific operation and maintenance tasks.
- The UO shall report to LG (and PG) for regulatory compliance and other relevant matters.
- The UO is entitled to form subcommittees if there is a need for it and the SMG is large enough to make such subcommittees vital for the sustainable operation of the system.
- Possible subcommittees include:
  - Technical subcommittee: for responding to special technical issues and challenges;
  - Financial subcommittee: for responding to special requests for financial oversight and report;
  - Productive Energy Use (PEU) subcommittee: for promoting PEU and raising funds for it;
  - Any other subcommittee deemed necessary by the Organization.
- The structure of the UO and its relationship with the entities shall be as shown in Figure 1.

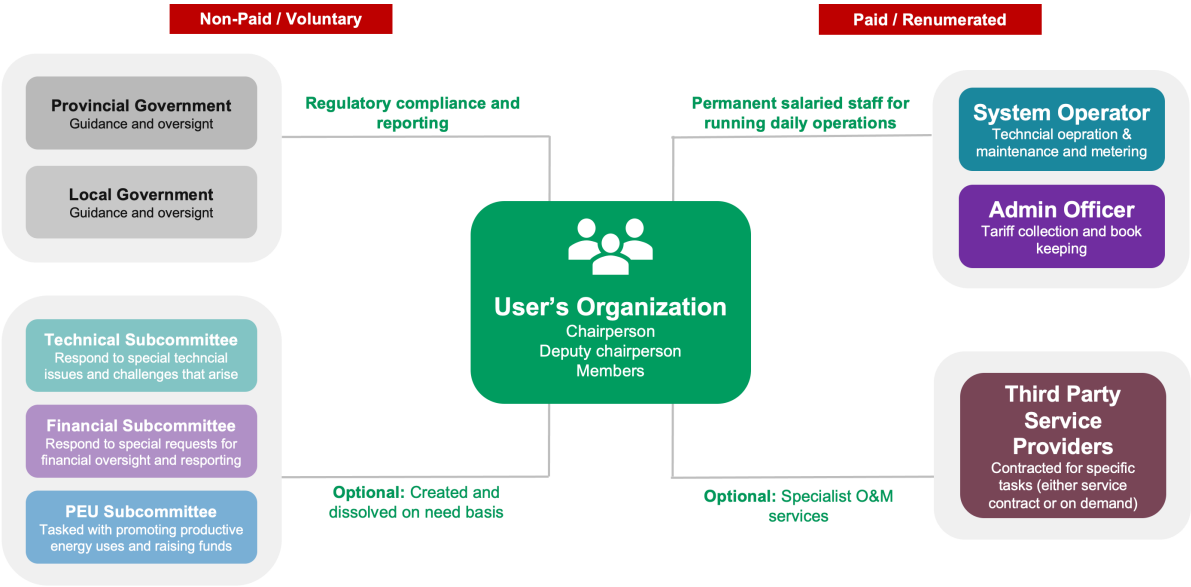


Figure 1: Structure of the User's Organization

3.2 User Committee formation

Before registration of the User's Organization, a wide-ranging mass meeting of users shall form a User's Committee (UC). The UC shall act as an executive body for the overall management and operation of the potential SMG. UC formation process shall be as follows:

- Community representatives shall notify people about the meeting venue, date, time and agenda seven days before the meeting date.
- In case the SMG has to be implemented in partnership with LG, PG, the federal government and development partners; the UC shall be formed in the presence of LG representatives in coordination with the concerned ward committee.
- Among the users, a 7 to 11-member UC shall be formed through the mass meeting.
- In case the SMG covers many communities, the UC shall be formed in the presence of the Ward Chair or the ward member nominated by the Rural Municipality Chair/Mayor.
- Local government personnel or representative shall deliver a brief introduction of SMG to the public including the proposed structure and nominated people for the UC.
- As far as possible, 33 percent of positions of the proposed UC shall be female.
- Only one person from a joint family can be nominated for the UC member, but the same person shall not be nominated in more than one UCs.
- As far as possible, the UC shall be formed on a consensus basis. In case consensus cannot be reached, the UC shall be formed on a majority ruling basis. In case of disputes, the UC shall be formed in coordination with the concerned ward committee (in the presence of LG's executive member).

3.2.1 Qualification of personnel

- Permanent resident of SMG area.
- Above 18 years of age.
- Not recognized as a confirmed guilty person by the court in any criminal case.
- Has no government dues or unsettled advance in the account.
- Not working as a member in other Users Organizations.
- Elected people's representatives, government employees, teachers and employees of an NGO or development partner will not be eligible for becoming a member of the User's Organization.

3.2.2 Service period

- From the date of formation, the service period of the UC shall be for 4 years or as provisioned in the bylaw.
- In case any position becomes vacant due to any reason, the vacant position will be refilled in the next possible assembly meeting.
- Until the new UC does not assume office, the old UC shall undertake all M&O activities as before. The old UC shall hand over all the project-related assets, accounts and official documents to the newly formed UC.

3.2.3 Role, responsibility and duties

Users are both managers and owners of their SMG, so they shall be involved in every step of the SMG implementation cycle. In other words, UC is the main executive body responsible for planning, implementing, monitoring, managing and maintaining the scheme after completion. UC is also the responsible body for making essential arrangements for the future sustainability and reliability of the SMGs. Hence, the success of a scheme depends largely on the capacity of UC. Thus, it has many minute responsibilities during and after the implementation. The key responsibilities of UC shall be as shown in Table 2.

Table 2: Roles and responsibilities of the User's Committee

Implementation phase	Management and Operation phase
▪ Open a bank account in the name of the User's organization. ▪ Execute all activities as stated in the agreement. Activities shall not be executed by subcontracting with other contractors, individuals, and organizations. ▪ Organize and manage all official records using prescribed templates, forms and formats. ▪ Provide all official and project-related information to the members regularly. ▪ If any UO implements an SMG owned by LG, obtain directions from PG or LG before starting project works. ▪ Define and delegate roles and responsibilities for different subcommittees. ▪ Create or provide capacity-building training and exposure opportunities to its members. ▪ Request to LG or PG when changes in terms of quantity, quality, time, and cost have to be made. ▪ Provide necessary support to the LG/PG staff who is deputed to look after the SMG. ▪ Conduct a social audit and publish its outcomes. ▪ Mount an information board at the location highlighting salient features of the project. ▪ Obtain authority by assembly meetings to carry out specific tasks. ▪ Carry out quality assurance, construction supervision and payment scheduling activities.	▪ Hold regular assembly meetings. ▪ Implement all activities as directed by the assembly meeting and users committee meeting. ▪ Coordinate and remain in close contact with the LG and PG. ▪ Keep all legal obligations up to date. ▪ Prepare and get approval for the annual plan and budget through the assembly meeting. ▪ Carry out general audit and public audits on time. ▪ As per need, form/dissolve different subcommittees. ▪ Solve all disputes locally that arise within the scope of SMG. ▪ As per the need, hire, fire, and manage needful human resources such as Operators and Managers. ▪ Keep updated information and records related to administrative and financial transactions. ▪ Prepare periodic progress reports and financial statements, submit reports to the LG/UG as agreed, and present them to the users. ▪ Prepare different bylaws and M&O manuals for effective implementation of SMG activities. ▪ Collect electricity tariffs regularly and deposit them in the bank account. ▪ Carry out daily plant management and operation as per the set norms and standards. ▪ Manage all SMG assets such as equipment, materials, tools, documents and staff. ▪ Prepare annual M&O plans/programs and implement them regularly. ▪ Set up and mobilize M&O and PEU funds and promote PEU activities in the community. Use surplus funds in other priority areas as per the decision. ▪ Procure, store and use non-local materials including spare parts needed for the SMG and keep records. ▪ Facilitate/coordinate the conduction of saving/credit activities by forming different community groups. ▪ Call for a general assembly meeting before the expiration of its tenure. ▪ Ensure the use of technical standards and day-to-day plant operation guidelines. ▪ Train technical staff and ensure a competitive salary package to retain experienced human resources. ▪ Decide to add or cut the power lines of individuals. ▪ Protect the project from vandalism or provide security to the project.

3.3 Meeting procedures

3.3.1 General assembly meeting

- General assembly meetings shall be conducted at least once a year within the first trimester of the fiscal year, and any additional meetings as needed.
- The User's Organization (UO) chairperson shall chair the general assembly meeting.
- In the absence of the chairperson, the vice chair shall take the responsibility of the chairperson.
- Key invitees shall include all UO members, advisors, users, a representative from local government, representatives from local institutions, representatives from local civil society organizations, a representative from an SMG association, a representative from an SMG cooperative and other important person/institutions related to the mini-grid.
- The UO treasurer shall present a mini-grid-related financial report including income and expenditure status in writing for the endorsement.
- The UO secretary shall present a periodic progress report that includes operational status, user numbers, institutional/legal status, administrative status, technical status, immediate challenges and opportunities, plan, etc. in writing for the endorsement.
- The UO shall respond to all queries raised by participants that are related to the mini-grid.
- The assembly meeting shall be conducted in stepwise procedures as below:

  Step 1 - Preparation and participation: UO chairperson shall prepare a general assembly meeting agenda, schedule, and list of invitees ahead of time.

  Step 2 - Call for a meeting: The UO chairperson shall officially call for the meeting at least 7 days in advance. Institutional representatives shall be invited through letters and users through reliable means of communication.

  Step 3 - Meeting conduct: The meeting shall be chaired by the UO chairperson and started on time. After reaching a 50% minimum participation, the meeting shall be started. All the agenda shall be discussed in a cordial, systematic, and democratic manner and decisions shall be taken on a consensus basis.

  Step 4 - Minute taking: The UO shall take a minute of all decisions taken by the assembly meeting. Minutes shall be neatly written, recorded in the minute book and maintained by the secretary or designated person. The secretary will need to ensure the recording of the date, time, location, list of attendees, signatures, decisions, actions, etc. in the minute book.

  Step 5 - Meeting closure: The chairperson shall formally end the meeting when the agenda has been completed or when the scheduled end of the meeting time arrives. The decision made shall be informed to all concerned through the notice board.

3.3.2 Regular meetings

- The User's Organization meeting shall be called by the UO chair when needed to take decisions on M&O, legal, social or other related issues.
- In normal conditions, a UO meeting shall be held at least once a month.
- The UO chairperson shall chair the meeting.
- In the absence of the chairperson, the vice chair shall take the responsibility of the chairperson.
- The UO chair shall take advice from other committee members to set out the meeting agenda and meeting dates.
- The regular UO meeting shall follow stepwise procedures as below:

  Step 1 - Preparation: The UO chairperson shall prepare a meeting agenda ahead of time based on the urgency of issues to be discussed and decided.

  Step 2 - Call for a meeting: The UO chairperson shall formally call for the meeting at least two days in advance. All UO members and key invitees shall be communicated through a letter or other reliable means of communication with indications of the discussion agenda. In case specific reports are to be presented, copies of such reports shall be distributed together with the invitation.

  Step 3 - Meeting conduct: The meeting shall be chaired by the UO chairperson and started on time. After attaining a 50% quorum, the meeting shall be started. All agendas shall be discussed in a cordial, systematic and democratic manner, and decisions shall be taken on a consensus basis as far as possible.

  Step 4 - Minute taking: The UO must take minutes of all decisions made during UO meetings. Minutes shall be neatly written, recorded in the minute book maintained by the secretary or designated person. The secretary shall need to ensure correct recording of the date, time, location, list of attendees, signatures, decisions, completed actions, etc. in the minute book.

  Step 5 - Meeting closure: The chairperson shall formally end the meeting when the set agenda has been completed. Any decisions shall be read out before the conclusion. A copy of decisions needs to be pinned to the notice board.

3.4 Financial procedures

3.4.1 Accounting procedures

- Users Organization shall maintain a cash ledger, individual users account, loan registration account, arrears settlement accounts, income, expenditure, assets and liability accounts, and other accounts as appropriate. All books of accounts shall be in the standard form and format.
- All financial transactions shall be recorded in a double-entry accounting system.
- To a possible extent, accounting software shall be installed and used.
- All the income including electricity bills, saving, loans, interest, membership fees, charges, etc. shall be accounted for under the income heading.

- All payments shall be made after ensuring the availability of the budget, support documents and approval by the authority.
- All payments shall be made through bank cheque as far as possible except in the case of petty cash.
- Payment-related information shall be recorded in the specified ledgers or personal accounts immediately.
- All transaction-related bills, receipts, and vouchers shall be recorded and filed properly.

3.4.2 Financial rules and regulations

- The manager shall report monthly financial status in the UO meeting for review.
- The annual program and budget shall be prepared in a participatory manner and implemented after getting approval from the assembly.
- If the approved budget of any head is insufficient, re-appropriation from other heads shall be made after getting a mandate from the assembly.
- Managers shall maintain financial discipline and cost-effectively perform financial dealings.
- To execute specific administrative and managerial tasks, subcommittee coordinators or managers can receive cash advances by fulfilling set financial rules. Before obtaining any cash advance, previous dues shall have been settled by the receiver.
- All full-time working staff shall be eligible to obtain one month's advance salary based on their application for logical reasons.

3.4.3 Bookkeeping procedures

- Generally, the manager shall be responsible for the collection of tariffs.
- The collected tariff from each individual shall be recorded in the personal account and payment receipt shall be given to the user.
- The user's card shall be filled out and signed by the tariff collector.
- The tariff collector shall deposit the accumulated amount in the bank account preferably every day or as directed by the User's Organization.
- The electronic record for the collective tariff of each individual shall be maintained using computer Excel sheets or software.

3.4.4 Procurement of goods and services

- User's Organization shall procure SMG-related goods and services for repair and maintenance or for stocking through qualified solar companies or reliable local vendors.
- As per the decision of the UO meeting, the treasurer or subcommittee coordinator can take the lead to procure goods and services worth up to 50,000 Rupees directly. For items worth more than 50,000, the UO meeting shall create acceptable procurement procedures and mechanisms.
- Goods and services shall be purchased based on the lowest price quotes offered by at least 3 suppliers.
- Payment for such goods and services shall be done through a bank.

- Procured physical items shall be registered in the stock book mentioning item numbers, cost, quality, engrave numbers, etc. and given out based on the approved demand form, with code/serial number painted.
- A VAT bill shall be obtained from the supplier/service provider companies.
- While procuring engineering, financial, legal and other related services, the UO shall follow the same procedure as the provision for the purchase of goods.

3.4.5 Bank account and use of fund

- User's Organization shall have a bank account in a dependable financial institution nearby, preferably A or B-class bank.
- The bank account shall be jointly operated at least by two persons. One of them shall be the chairperson and others could be treasurer, manager, or both as decided by the assembly meeting.
- Principally, all types of cash income should be deposited in the bank account every day but UO can make a suitable rule based on transaction volume.
- Bank vouchers shall be properly filed out and voucher amounts be posted in the income register accordingly.
- At the end of each month, a bank statement shall be obtained and reconciled to prepare a balance sheet.
- A reserve fund shall be used based on necessity by embracing universal financial principles and rules of the Users Organization.
- The financial activities of the Users Organization shall always be accurate, cost-effective and transparent to its stakeholders.

3.4.6 Audit exercise

- User's Organization shall carry out financial audits through a registered auditor within three months after the end of each fiscal year.
- The auditor shall be nominated by the assembly meeting before the audit exercise.
- Principally, the auditor himself has to present the audit report in the assembly meeting, and their remuneration shall be as negotiated by UO.
- The same auditor shall not be continued after 3rd audit exercise performed by him/her.
- The audit report shall compulsorily include good governance status within the UO such as financial discipline, organizational principles, lawfulness, adoption of LG/PG directions, cost-effectiveness, people's participation, etc.
- User's Organization shall conduct a public audit of its activities through its stakeholders together with the first assembly meeting of the current fiscal year.
- Stakeholders such as users, LG/PG representatives, suppliers, contractors, service providers, staff, workers, local civic organizations, etc. shall be invited to carry out the public audit.
- Stakeholders may ask any questions related to grants (financial, material, property, equipment, technical assistance etc), use of grants, income and expenditures, procurement procedures, name of the person engaged in different activities, tariff rate and collection, power production and distribution, opportunities, threats, etc.

3.4.7 Record keeping and reporting

- User's Organization shall securely maintain all minute books related to UO meetings and Subcommittee meetings together with institutional documents such as registration certificates, ownership documents, official agreements, guaranty/warranty certificates, handover/takeover documents, banking documents, share certificates, etc.
- Other routine administrative records such as employment records, users' registration books, users' personal information, electricity production log books, user-wise electricity consumption and payment records, maintenance records, general registration and despatch books, store books, audit reports, progress reports, M&E reports, official letters and other miscellaneous records shall also be maintained by the User's Organization.
- User's Organization shall produce different financial reports such as the financial accountability statement (FAS) if any, income and expenditure, details of account payables, deposits, receivables, advance and balance of funds, and statement of bank reconciliation, etc. within 15 days of next month.
- The UO shall produce monthly progress tracking reports against the annual plan.
- All records and reports shall be reviewed in the regular UC meeting.
- UO shall publish an annual progress report incorporating organizational, managerial, technical, financial and legal aspects together with organizational challenges and opportunities.

3.5 Fixed assets management procedures

3.5.1 Security provisions

- User's Organization shall need to arrange all possible security provisions in the plant and grid extension areas fenced to protect it from animals and trespassers.
- The powerhouse shall be a permanent structure designed to secure batteries and other equipment.
- Depending upon the availability of funds and urgency, security personnel can be hired by UO and trained on how to conduct regular patrolling, vigilance, and in-and-out record keeping.
- The nearest police station shall be informed immediately in case external security concerns are at an alarming stage.
- Security and safety rules/signs shall be prepared and displayed near the powerhouse and important places.
- Compliance with security and safety measures shall be strictly enforced by the UO.

3.5.2 Environmental protection

- The User's Organization shall reduce, reuse, recycle, and dispose of all stuff that potentially affects the local environment.
- Hazardous plant wastes, and e-wastes (used batteries, chemicals, insulators, plastic, lead, metals, etc) shall be safely disposed of according to government protocol.
- Natural ecosystem and cleanliness shall be maintained around the plant area.
- UO shall continuously monitor earthling and wiring systems as well as potential natural threats such as floods, landslides, storms, etc.

3.5.3 Asset accounting

- Account of fixed assets such as PV modules, Inverter, utility meter, AC (MDP, main distribution panel), utility grid, pole, office building, furniture, equipment, tools, vehicle, etc. shall be systematically recorded in main and other subsidiaries' accounts.
- A standard ledger book with procurement details, serial number, quantity, location, receiver's detail, maintenance schedule, etc. shall be maintained and kept operational.
- Fixed assets shall be marked and tracked through code/serial numbers.
- The user's Organization need to maintain a record showing item-wise installation date, repair dates, and replacement date.
- Similar standard subsidiary account books shall be maintained for the record of consumable items such as wire, bulbs, switches, paper, pens, towels, cleansing items, etc.
- Warranty/guaranty-related documents and property insurance policies if any shall be managed properly.

3.5.4 Other provisions

- UO shall regularly monitor the work performed by its staff members, particularly on asset management aspects.
- Staff shall be given various on-the-job training on asset management so that they can deliver better results in future.
- UO shall regularly update its bylaws and operational procedures to cope with emerging management challenges.

3.6 System Operator

3.6.1 New operator selection

- The UO could officialise existing operators appointed by the installer company or can hire a new operator through transparent selection procedures.
- Depending upon the workload, the UO shall hire a full-time or part-time system operator.
- The SMG operator/s shall be selected by UO in transparent and competitive ways through the Technical Subcommittee (TSC).
- The following steps shall be strictly followed while selecting the most qualified operator:
    1) In case an employee management manual is not developed, the UO or its TSC shall decide the scope of work, salary and benefits, working hours, educational qualification and experience, service duration, type of contract (daily wage, salaried), evaluation criteria (written test, practical test, interview), annual budget, etc.
    2) The UO shall publish the vacancy announcement with all details through its notice board or local newspapers or local Government notice board as appropriate.
    3) The UO shall collect applications, shortlist the candidates, conduct examination/s and publish the result at its notice board or local newspapers or local government notice board as appropriate and as decided by the UO meeting.
    4) The successful candidate/s shall be awarded an appointment letter along with the job description.

3.6.2 Roles and responsibilities

- The system operator shall be responsible for the safe and secure operation of the powerhouse, distribution network, collection of meter readings and reporting of system performance as per the predefined monitoring indicators.
- The tasks and responsibilities of the system operator shall be adequately defined in the operation and maintenance manual to be available to the operator by the User's Organization.
- Some indicative tasks related to powerhouse include:
  - Regularly clean the solar panels, the powerhouse indoor area and the surrounding outside area.
  - Check the system components (electrical devices, battery, mechanical structures, wiring, etc.) for signs of damage, overheating or rust, etc.
  - Handle electric switches to terminate/supply electricity flow as per the schedule.
  - Stay attentive to the security and safety concerns of electric equipment and operating tools.
  - Properly maintain spare parts and consumables and use them as directed by the UO.
- Some indicative tasks related to the distribution network include:
  - A regular check of the cables and poles for stability, rust, corrosion or other possible physical damages.
  - Check the earthling points in the network and ensure that they are not disassembled or damaged.
  - Monitor the drop-down cables for user connections and ensure no illegal connections are made from the network.
- Some indicative tasks related to the metering system include:
  - Perform meter readings of user households (but the system operator shall not collect bill amounts if a separate admin officer is also hired by the Organization).
  - Assist users in properly using the meters and detecting any theft or misuse.
- Tasks related to reporting duties include:
  - Adequately fill and submit the reports as per the daily, weekly, monthly and yearly reporting templates provided by the User's Organization.
  - Report on urgent or other critical matters to the Organization as soon as the issue is discovered.
- Other possible tasks of the system operator include:
  - Perform every action based on the operation and maintenance manual provided by the User's Organization and learned from the training.
  - Carry out all other tasks as directed by the authority.
  - Consult the Installer Company or the service provider or SMG engineer before executing risky technical jobs.
  - Participate in the UC and TSC meeting as an observer, flag any M&O-related issues and follow given instructions.
  - Perform all M&O activities that are not included under the TOR of the service provider or Installer Company.
  - Monitor the performance of the system and report to the User's Organization regularly. Detailed monitoring indicators, data collection and reporting are defined further in section 7.5 of this guideline.

- Carry out services like changing bulbs, and wiring works upon request by the users.

3.6.3 Operators' salary and source of funds.

- The salary of the operator shall be determined by UO by taking some useful references such as:
  - The average salary of a certain number of SMGs near that SMG site.
  - Salary scale as prevalent in another nearest SMG site.
- The salary scale should be SMG-specific that shall be determined based on annual revenue.
- Daily working hours, overtime provisions, leave days, festival allowance, travel allowance, daily allowance etc shall be given as per the organizational HR rules.
- The operator shall be treated as regular staff of the User's Organization.
- The operator's salary and associated expenses shall be included in the annual program and budget under the appropriate budget heading.
- The required budget for the salary shall be managed from regular income sources (sale of electricity) of the User's Organization.

3.7 The Manager

3.7.1 Selection procedure

- As per the need, a Manager [or provide appropriate name] can be employed by User's Organization to look after all finance and managerial tasks.
- The User's Organization shall initiate the recruitment process perusing transparent and competitive methods.
- The Manager shall be recruited by adopting the same procedure set out for the system Operator.

3.7.2 Roles and responsibilities

- The Manager shall be responsible to play the role of an accountant of the User's Organization and maintain all books of accounts related to the accounting.
- The Manager shall prepare financial rules and regulations, tools, forms/formats, etc. which are essential for the day-to-day business.
- Collect the tariff regularly, maintain records and deposit the collected sum in the bank.
- Be responsible to carry out an internal audit by the Finance and Managerial Subcommittee (FMSC) and an external audit by an independent auditor.
- Perform all income and expenditures related activities as per the bylaws and financial norms.
- Support User's Organization to prepare all types of admin and finance-related reports.
- Maintain all administrative records like user's registration book; minute books, stock books, purchase book, registration book, dispatch book, attendance book, contracts, agreements, etc.
- Secure and manage the organization's physical, economic and social capital.
- Take advice from the UO chair or FMSC coordinator when a critical issue arises.

- Conduct general administrative, managerial, and accounting activities as directed by the User's Organization.

3.7.3 Manager salary and source of funds

- The salary of the Manager shall be determined by UO by taking some useful references such as:
  - The average salary of a certain number of SMGs near that SMG site.
  - Salary scale as prevalent in another nearest SMG site.
- The salary scale should be SMG-specific that shall be determined based on annual revenue.
- Daily working hours, overtime provisions, leave days, festival allowance, travel allowance, daily allowance, etc. shall be given as per the organizational employee management manual.
- The Manager shall be treated as regular staff of the User's Organization.
- The manager's salary and associated expenses shall be included in the annual program and budget under the appropriate budget heading.
- The required budget for the salary shall be managed from regular income sources (sale of electricity) of the User's Organization.

PART 4
MANAGEMENT THROUGH COOPERATIVES

4.1 Cooperative structure

- For M&O of the SMG via this modality, either a new SMG-oriented cooperative may be established, or an SMG technical committee integrated into an existing multipurpose cooperative (microfinance).
- In either case, the mandate of the cooperative will be larger than just the management of the SMG. The following graphic presents a proposed structure for SMG-related operations under a multipurpose cooperative.

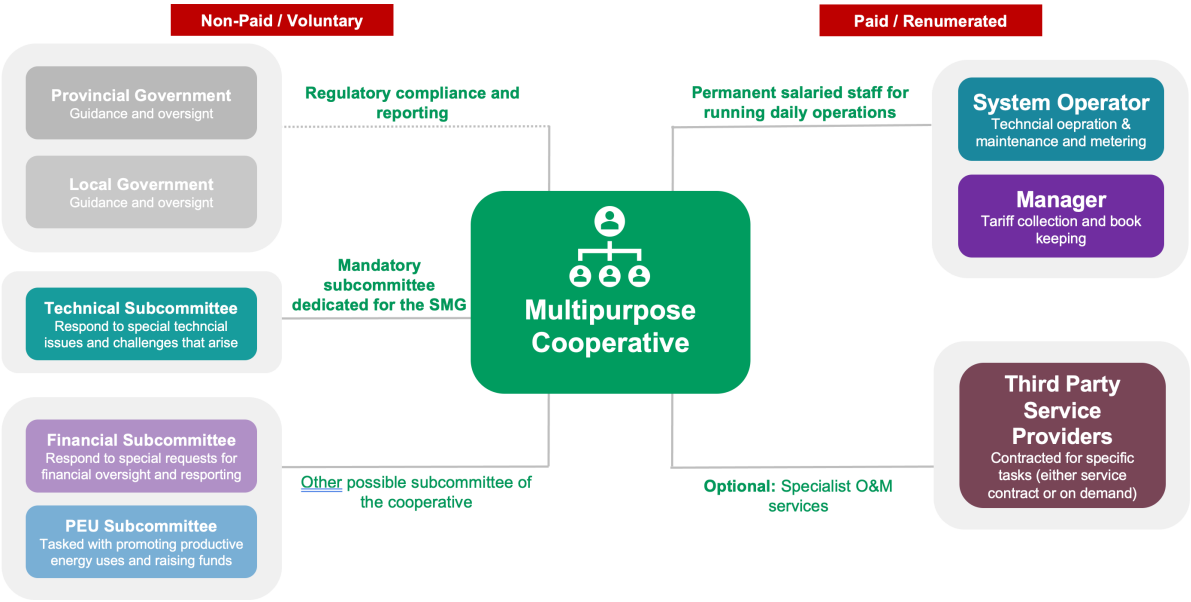


Figure 2: Organizational Structure of Multipurpose Cooperative

Note: The multipurpose cooperative may have other functions through different subcommittees. But they are not discussed here since they are not under the scope of this guideline.

4.2 Cooperative establishment

- Solar electricity users can unite into a multi-purpose Cooperative in three different ways:
  - At the time of inception, potential users of SMG can be organized as a Cooperative to plan, implement, operate and manage the system.
  - Existing UC can be graduated into a Cooperative.

- UC itself can be a member/shareholder of an already established Cooperative in the locality.

- Everyone who uses electricity shall be eligible to be a member of the Cooperative.
- Cooperative shall be a voluntary organization to provide better electricity services to its members and obtain associated economic benefits.
- Cooperative shall be established based on the user's willingness to obey Cooperative laws and principles, management capacity and other eligibility criteria set by the Cooperative rules.
- In case, LG/PG has not yet formulated its Cooperative law, the multipurpose Cooperative shall be formed following the federal Cooperative Law 2074, Cooperative Rules 2075 and related guidelines *(Digdarshan)*.
- Cooperative formation shall go through a 5-step graduation process as:
  - Community discussion,
  - Pre-consultation with the Cooperative registrar,
  - Pre-cooperative education to potential members,
  - First initial mass meeting,
  - Second initial mass meeting.
- Submission of application to the authority for the registration with essential documents.
- Potential Cooperative shall develop its dynamic bylaw and get endorsement by its second assembly meeting before registration.
- Cooperative shall be essentially registered in the LG. However, in case the energy users are from different LGs, then such Cooperative shall be registered with the provincial government.
- After registration of the Cooperative, a certificate shall be obtained.
- The Cooperative shall carry out its functions and activities as a multipurpose Cooperative only after registration.
- Cooperative shall be eligible to be a member of relevant federations or like-minded loose forums.

4.3 Management Committee

- Based on the approved bylaws, the Cooperative shall form its Management Committee, MC (executive and members) by adopting a democratic election process in the presence of a local government representative.
- There shall be at least 11 members in the MC, which shall be socially inclusive.
- MC shall be formed in the physical presence of members in the assembly meeting.
- MC shall be formed according to the Cooperative laws of LG or PG or Cooperative Law 2074 issued by the federal government.
- In case of a breach of Cooperative norms and values, MC shall be dissolved with a simple majority of members physically present in the assembly meeting.
- Other provisions such as qualification, tenure, meeting procedures and ineligibility criteria shall be as denoted by the Cooperative bylaws.

- At a minimum, a technical subcommittee must be established for managing the affairs of the SMG on behalf of the cooperative.

4.4 Functions and authorities of the Management Committee

- Be responsible for the overall management of the Cooperative by embracing Cooperative norms and principles.
- Keep all administrative and financial activities up-to-date.
- Carry out Share ownership transfer and return-related works.
- Carry out membership expansion or dismissal-related works.
- Obtain loans from reliable financial institutions as needed.
- Maintain, update and verify business accounts.
- Formulate or dismiss different subcommittees such as financial subcommittee, technical subcommittee, electricity subcommittee, saving credit subcommittee, monitoring and supervision subcommittee, social subcommittee, economic development subcommittee, etc.
- Recruit managers and other staff and determine their salary/wage and other benefits.
- Take necessary decisions to obtain essential legal advisory services.
- Prepare annual plan and budget and get approval from an assembly meeting.
- As per the approved bylaw, call for assembly meetings and effectively manage them.
- Implement all decisions made by assembly meetings through subcommittees and the staff.
- Make necessary arrangements to conduct audit exercises through an authorized auditor.
- Prepare draft policy documents, reports, program and budget, and agenda to be endorsed by the assembly meeting.
- Create opportunities or provide capacity-building training and exposure visits to MC and members on a regular basis.
- Allocate management responsibilities to executives and committee members as appropriate maintaining equality in terms of workload.
- Form an unbiased election committee to elect a new executive committee before the completion of its tenure.
- Carry out other responsibilities as directed by the assembly meeting or Cooperative laws.
- Prepare the reporting forms, format and templates to submit an annual report to the local and provincial governments.

4.5 Other provisions

- Provision regarding SMG-related fixed asset management shall be as described in section 3.8 of this document. The provision concerning to system operator shall be as described in section 3.9 of this document.
- Wherever applicable, the Cooperative shall adopt provisions outlined in the UO management modality under Part 3 as appropriate.

PART 5
TARIFF DETERMINATION AND COLLECTION

5.1 Tariff determination

- The organization shall determine electricity tariffs on a scientific basis but considering users' willingness and ability to pay and the local context.
- The organization may adopt a simple cost-effective method (in which users pay a tariff that matches the cost of the efficient operation and maintenance of the solar mini-grid) to determine the tariff value of subsidized SMGs.
- By default, the tariff shall be determined to recover salaries of hired staff, fees for third-party service providers and small repair and maintenance. The costs of large replacements, such as batteries, will not be included in the calculation to not burden the users with high tariffs. However, if the majority of the user agrees (via a general meeting of the Organization), they may decide to keep a higher tariff to create a budget for such large replacements as well.
- In the first year of operation, if it is difficult to determine the tariff value based on a cost-effective method, Organization may rely on one of the following two options:
  - Adoption of tariff values similar to other functional mini-grids nearby.
  - Adoption of tariff values[1] recommended by the solar mini-grid Management and Operation guideline 2076, issued by AEPC/RERL.
- From the second year onwards, Organization shall adopt one of the following methods to determine general tariff value:
  - **Uniform tariff** determined based on cost-effective method:
    - Step 1: Calculate the total sum of the annual M&O cost[2] of the plant in Rupees (C).
    - Step 2: Calculate the total consumption of electricity by the users in kWh (E).
    - Step 3: Calculate the minimum per unit cost by dividing C by E.
    - Step 4: Add 5-12 percent to cover unforeseen expenditures and profit.
    - Step 5: Finalize uniform tariff value in round number.
  - **Differential tariff** determined based on cost-effective method: The Organization may decide to use different tariffs for households, institutions, businesses, etc. to flexibly adjust the tariff based on the social and economic conditions of the community. The tariff

[1] Domestic = Minimum Rs.100+ Rs 10 per unit; Industrial= Minimum Rs.500 + Rs 12 per unit.

[2] Total M&O cost includes management cost (software cost + staff cost + third party service provider cost + land lease cost + logistic cost + utility cost etc), maintenance cost and miscellaneous cost.

calculation tool provided in Annex A.23 with this guideline may be used for this purpose. The following principles of cost-effective tariff methodology must be observed in any case:

- Total collected revenue from tariff must be greater than total M&O costs.
- The total revenues must include a buffer of 5-12 percent to cover unforeseen expenditures.
- There must be a minimum service charge considered in the calculation method.
- As far as possible, a smart metering system shall be built-in so that a time-of-use-based tariff structure can be adopted, if feasible.

- In case, the tariff has to be kept below the cost-effective method, Organization shall request LG, PG or other funding agency for covering the gap between the revenue and actual cost.
- The Organization can collect a certain amount as a connection charge or service charge based on the type of users on top of the tariff.

5.2 Tariff approval procedure

- The tariff structure can be reviewed at any time but ideally in two years intervals by a team of people formed by the Organization. Recommended tariff structure shall be reviewed and discussed in the Organization.
- The organization shall inform LG about the newly established tariff structure.
- The new tariff structure shall be approved by the assembly meeting.
- Usually SMGs tariff becomes significantly higher compare to national grids, so the Organization shall realize this fact and explain it to users.

5.3 Tariff collection, penalty and rebate

- The UO shall introduce a computer-based pre-paid system to collect tariffs in which electricity users are entitled to buy needed power in advance for the next month through a recharge card.
- Only in case the recharge card system cannot be introduced due to valid reasons, a traditional tariff collection, penalty and rebate system shall be adopted.
  - All users shall pay their monthly electricity bill by the 7th day of next month to a designated person or collection centre.
  - Users shall be notified about the due date through SMS or other reliable methods.
  - The user shall pay a progressive penalty in case of failure to pay on time and be rebated in case of advance payment as below.
    - Penalty 5% extra up to 15 days, 10% extra up to 30 days, and 50% extra up to 60 days.
    - Rebate 1% less for 15 days advance payment, 2% less for more than 15 days advance payment.
  - The power supply shall be interrupted considering 61 days as the cut-off point and may be resumed upon full payment with a penalty.

- All users shall be provided with a User's Card to secure electricity consumption and payment records.
- The organization shall provide a receipt for each payment including mention of rebated and penalty amounts.

PART 6
OTHER ORGANIZATIONAL PROCEDURES

6.1 Ownership and registration

- All subsidized physical properties of the SMGs shall be considered public property unless specified.
- These public properties, as listed in the handover document, shall be operated and managed by the Organization.
- Management responsibility can be transferred to another Organization only via the decision of the user's assembly meeting. Responsibility allocation shall be done by fulfilling established procedures, or as directed by the LG.
- In case of complete dysfunction of SMGs due to any reasons, LG shall acquire all public properties and handover to the new management setup for the operation or can auction it in the worst-case scenario.
- The organization shall be registered at the local government/provincial government (if the users are from two local governments) by fulfilling its due processes and obtaining a registration certificate.

6.2 Handover procedures

- All SMGs shall be handed over to the Organization (User's Organization/Cooperative) by the installer company or subsidy provider in writing.
- The Organization takes over the responsibility of the SMG after commissioning is completed. The Organization can support the installer company or other agencies during implementation, but its sphere or responsibilities only start post-commissioning, i.e., in the operation phase of the SMG.
- Before initiating the handover process, the Installer Company shall have completed all civil, electrical, and mechanical works as per the bidding documents and agreement(s) with the (User's organization/Cooperative) which includes testing and commissioning, performance testing, essential training, etc. Upon completion, a work completion certificate shall be provided to the Installer Company by the User's Organization.
- A handover document shall be prepared to declare all terms and conditions, warranty/guaranty periods, payable amounts, list of goods/equipment/documents, the legal obligation of signatories and other essential information about SMGs. The Organization shall thoroughly read the handover document to a satisfactory level before signing it.

- The handover document shall be signed by the Organization's chairperson and authorized person of local government, Installer Company, donor agency, or government agency as applicable.
- A copy of the signed and stamped handover document shall be obtained by the signatories. The handover document is then to be considered a legal document for SMG ownership.
- There should be a mandatory presence of a representative from the local government during the handover ceremony.

6.3 Roles and responsibility

6.3.1 Local government

- Register the Organization (Users Organization or multipurpose cooperative) as per the established LG's rules and regulations.
- LG should prepare/submit an application to the AEPC or PG for obtaining a subsidy from the federal government. In case a subsidy has to be obtained from PGs, a similar process needs to be followed.
- LG shall provide equity contribution as per the subsidy policy of AEPC and settle land issues to establish SMG.
- LG shall regularly review policy guidelines related to the solar mini-grid operation, management and tariff fixation procedures.
- LG shall help introduce new technologies and capacitate Organization through training and exposure visits.
- Provide facilitation support to resolve any disputes, increase system capacity, enhance organizational capacity, increase access to microfinance opportunities, and improve access to the market for local production.
- Provide technical, financial and coordination support for major replacement, repair and maintenance as well as promote PEU activities among the users.
- Take part in Organization's assembly meetings, regular meetings, and subcommittee meetings as appropriate to enhance the management capacity of Organizations.
- Provide overall leadership, and guardianship and safeguard user's rights uninterruptedly.
- LG shall monitor the activities of the Installer Company during and after the SMG installation.
- LG also oversights the performance of UO/cooperative and ensure the use of standard SMG operation guidelines.
- In case of severe breakdown of major SMG components due to any unavoidable reasons, invest to restore the system and find a better way out to continue electricity services in the community.
- On behalf of the Organization, negotiate with NEA while executing net-metering policy.
- Coordinate with Provincial Government for major replacements at SMG.
- Prepare and endorse the Public Private Partnership (PPP) Act, regulations to install any projects under the public-private partnership model.

- Form an Energy Development Sub-Committee (EDSC) at LG which is responsible for all energy-related activities with the LG.
- Provide business sensitization training to promote productive energy use (PEU) activities.
- Develop market or value chain mechanisms for selling the goods through PEU activities.
- Depute a business development officer to promote micro, small and medium (MSME) enterprises within the local government.
- Provide approval for the enterprise establishment for those entrepreneurs who wanted to take subsidies from different development organizations for the promotion of PEU.

6.3.2 Provincial government

- Facilitate registering the SMG Organization in case users are from different LGs.
- Regularly train LGs and stakeholders on M&O policies, guidelines, procedures, etc. to enhance their skills and management capacity.
- Upon request by LGs, provide technical, financial and coordination support for major replacement, repair & maintenance of SMGs and promotion of PEU activities.
- Occasionally visit SMGs and provide necessary feedback to Organization and LGs.
- Maintain province-level SMG database that includes geographic location (via GPS), number of users, date of establishment, power generation, cost, support agency, Installer Company, management models, leadership & contacts, number of PEUs, etc. Publish an interactive map incorporating this information to improve future program development.
- Conduct province-level research/studies/surveys in the areas of- technical, social, and economic impacts on a priority basis, and publicize learning products.
- Establish a provincial-level support mechanism to support SMGs, particularly in the areas of Battery replacement, routine check-up and maintenance, and net-metering with NEA.
- Introduce best M&O practices from elsewhere and encourage LGs to adapt them.
- Coordinate with federal government agencies (AEPC, NEA, ministries) and development partners for obtaining funding and organizing capacity development activities.
- Develop the provincial acts, policies, regulations, directives and other legal documents for the promotion of productive energy use (PEU) activities from the energy projects within the province.
- Depute a technical officer responsible preferably an electrical engineer responsible for the solar energy activities within the province.

6.4 Reporting to LG and PG

- The organization shall provide an annual progress report and audit report of the previous fiscal year to LG and PG by the end of 1st trimester of the consecutive fiscal year.
- The annual report shall comprise various topics such as organizational structures, assembly/committee meeting status, major decisions, staffing status, membership status, property in possession, the capacity of the plant, electricity production and consumption status, distribution status, maintenance status, tariff structure, legal aspects, annual plan vs. progress, training and exposure visits, coordination and linkage, annual budget and expenditure, saving credit status, PEU status, major challenges, expectations from LG and PG, etc.

- Users Organization/cooperative shall provide any specific information or occasional reports to LG/PG on demand.

6.5 Operation & maintenance manual

- The organization shall establish special arrangements to ensure the continued functioning of M&O activities of the SMG. All technical and managerial arrangements shall be documented in the form of an M&O manual in the Nepali language.

6.6 Training of operators

- The operator is the key person of the SMG so he/she shall be well-oriented/trained in various M&O procedures. The organization must ensure that the operator understands and follows all essential M&O procedures, can perform given tasks and provide suggestions.
- The installer company shall be responsible to provide training (knowledge and skills) to operators before the handover of the SMG. (Please refer to Annex A.4 for indicative contents for Operator's training).
- Operators shall be provided refresher training by the UO at least once a year to enable them to deal with pertinent technical issues.

PART 7
POST-INSTALLATION CARE

7.1 Repair and maintenance framework

- The organization shall obtain all post-installation M&O services from the installer company as per the agreement within the guarantee/warranty period.
- Electrical equipment shall undergo regular inspection and fine-tuning at the frequency recommended by the manufacturers to avoid breakdowns, production losses and downtime. The operator shall carry out various activities such as solar panel cleaning, vegetation management; DC & AC subsystem cleaning; checking the integrity of connections and terminations; mechanical inspection, documentation; physical observations, electrical tests for solar panels, inverters and batteries, thermography imaging to identify potential failure (if any), etc. Such activities shall be included in the annual maintenance plan of the Organization.
- Upon the occurrence of minor breakdowns, the Operator shall immediately fix electrical equipment to restore its normal functions. Activities to be done under this M&O category are failure analysis, emergency maintenance, repairs and replacements, replacement of fuses and meters, rectifying remote monitoring faults (if any), etc.
- Based on real-time data, the system Operator/service provider should be able to anticipate the potential failure of electrical equipment. Such susceptible or malfunctioning equipment shall be replaced immediately. Some electrical equipment to be identified under this category are DC arrays, transformers, inverters, etc.
- Upon an unexpected major failure due to fire, theft, malfunction, design fault, etc., an unscheduled maintenance action shall be carried out by the Organization. Organizations are expected to remain ready to face such situations with preparedness.

7.2 Maintenance fund

- The organization must establish a dedicated maintenance fund that is enough to cover all types of recurring maintenance work.
- Maintenance funds shall be generated by allotting 5 to 12 percent of the collected revenue each month.
- Maintenance funds shall be kept in a separate bank account and jointly operated by Treasurer and Chairperson or as recommended by the assembly meeting.
- All types of preventive, corrective, predictive and extraordinary maintenance works shall be done by utilizing this fund.
- All maintenance works above Rs.10,000 (Ten thousand Rupees) shall be approved by the Organization before making any expenditure. For less than Rs. 10,000 worth of maintenance, the chairperson can grant verbal permission to make maintenance expenditures.

- In case the cost estimate of particular maintenance work exceeds Rs.50,000 (Fifty thousand), Organization shall adopt a bidding process (price quotation from 3 service providers) to procure essential goods and services.
- The Organization or its TSC shall be responsible to plan, procure, monitor and certify all the maintenance works done by the service provider/s.

7.3 Spare parts and tools

- The organization shall keep stock of consumables, spare parts and relevant tools for regular M&O of the PV plant as recommended.
- Spare parts shall be procured by using the maintenance fund and stored in the safest place possible (no high humidity or heat, no fear of theft, no rodents, etc.) near the plant.
- In case specific spare parts have to be supplied by the service provider as per the agreement, then the service provider shall bear the cost of such items.
- An inventory of spare parts and tools shall be maintained. This includes the date of purchase, date of replacement, the major cause of breakdown, warranty details, price details, etc.
- Adequate quantity of spare parts, consumables and tools shall be procured based on analysis of key factors such as frequency of failure, the impact of failure, cost, degradation time, availability, etc. Below is the suggestive list of reserve materials.
  - Fuses for all equipment (inverters, combiner boxes, etc.) and fuse kits
  - Modules (no need for spare modules for less than 100 kWp plant)
  - Inverter spares (power stacks, circuit breakers, contactor, switches, controller board, etc)
  - Uninterruptible Power Supply (UPS)
  - Voltage terminations (MV)
  - Power Plant controller
  - Switchgear
  - Screws and other supplies and tools
  - Harnesses and cables
  - Specified module connectors (male and female should be from the same manufacturer).

7.4 Minimum safety requirements

- The organization shall describe essential health and safety provisions in the Operation and Maintenance manual or comply with the health and safety and anti-theft protection manual issued by the government, and all staff and Organizational members shall be trained on set provisions.
- If financially viable, the Organization shall install an electric alarm system, and security guards as appropriate to secure the property depending upon the size of the SMG.
- Safety requirements shall be SMG specific, however following minimum safety requirements shall be ensured by the Organization.

Table 3: List of minimum safety requirements

Potential hazards	Minimum safety requirements
Electrical	▪ The operator shall be aware of and able to fix system conditions such as overheating, water contamination, humidity, high electrical stress, etc. ▪ The energy storage system shall be maintained only by a trained operator or technician. ▪ The risk of electrical shock should be mitigated with appropriate electrical insulations or by wearing appropriate personal protective equipment (PPE).
Mechanical	▪ Workers shall wear safety helmets while performing maintenance work to protect themselves from collisions or fall. ▪ Operators should wear a safety belt and gloves while working at poles.
Poisoning/ ill exposure	▪ All batteries after their performance period shall be safely disposed of to avoid poisoning by sulphuric acid or electrolyte materials.
Other	▪ Any incidence occurring due to an explosion, fire, thermal runaway, or the leaking of chemical components from the system shall be immediately fixed by the trained person. ▪ Adequate quantity of First Aid materials and fire extinguisher facilities shall always be managed near the plant area.

- When certain maintenance works are beyond the scope of the local operators, the Organization shall employ a commercial service provider. Such service providers shall be contracted to provide necessary physical or remote M&O services based on a competitive bidding process. The service provider will also be required to report on specific performance indicators as agreed in the scope of services.
- For the selection of service provider, Organization shall ask for a brief proposal from qualified companies incorporating different offers such as type of M&O services, quality and frequency of services, reporting modality, training/coaching provisions, associated costs, etc.
- After evaluation, a successful service provider shall be contracted by assigning specific roles and responsibilities for physical monitoring. In a broader sense, the expected areas of engagement of service providers shall be as follows:
    - The accomplishment of all activities as per the contract and within the agreed payment structure.
    - Use of the company's experience, resources, skills, capabilities and business ethics.
    - Quality services in terms of frequency, response period, goods, workmanship and manpower.
    - Dealing with all essential M&O services under each preventive (regular), corrective and extraordinary category.
    - Reporting on plant performance, system management, threats detection, power generation and distribution, forecasting, feedback, etc.
    - Training/coaching to the operator or relevant Organization personnel.
    - Monitoring reports.
- Upon failure to provide stipulated services, the Organization may terminate the contract by securing financial, managerial and physical assets.

7.5 System monitoring

- The objectives of system monitoring shall be to allow the organization to keep track of the performance of the SMG and identify and rectify issues at the earliest. This self-monitoring of the SMG is vital for ensuring sustainable operation in remote areas where outside intervention regularly is not possible.
- In addition, the organization shall collect monitoring data for reporting to the LG regularly.
- The organization shall also provide a monitoring report to PG when requested.
- The system monitoring shall have two aspects:
  - Physical monitoring: Collection of data on-site and documentation in the form of reports or other suitable tables and forms, etc.
  - Remote monitoring: Automated collection and transmission of data to a remote monitoring system operated by the LG, PG or other funding agency.

7.5.1 Physical monitoring

Figure 3 lists the key performance indicators for which data collection and reporting shall be undertaken as part of physical monitoring. The data collection forms and indicator measurement methods are elaborated in Annex A.22.

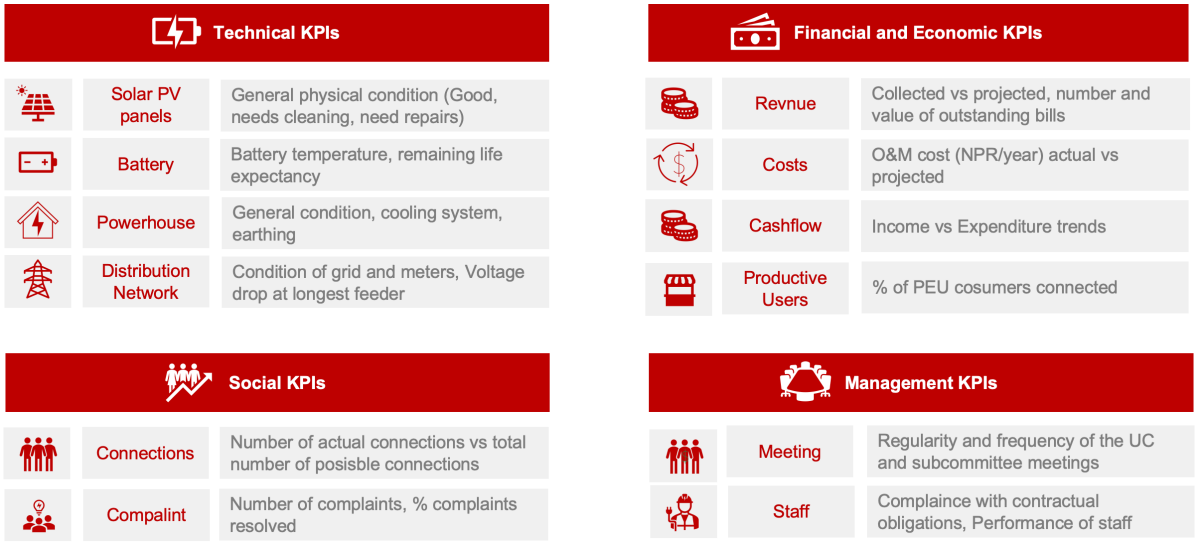


Figure 3: Key Performance Indicators (KPIs) for physical self-monitoring

- As far as possible, the system operator shall undertake operation and maintenance tasks as outlined in his roles and responsibilities. This also includes collecting monitoring data on the performance of the system and reporting it to the organization regularly.
- As appropriate, the Manager (if hired) shall support the system operator in collecting and compiling data as well.
- When certain maintenance works are beyond the scope of the local operators, the Organization shall employ a commercial service provider. Such service providers shall be contracted to provide necessary physical or remote M&O services based on a competitive bidding process. The service provider will also be required to report on specific performance indicators as agreed in the scope of services.

- For the selection of service provider, Organization shall ask for a brief proposal from qualified companies incorporating different offers such as type of M&O services, quality and frequency of services, reporting modality, training/coaching provisions, associated costs, etc.
- After evaluation, a successful service provider shall be contracted by assigning specific roles and responsibilities for physical monitoring. In a broader sense, the expected areas of engagement of service providers shall be as follows:
    - The accomplishment of all activities as per the contract and within the agreed payment structure.
    - Widespread use of the company's experience, resources, skills, capabilities and business ethics.
    - Quality services in terms of frequency, response period, goods, workmanship and manpower.
    - Dealing with all essential M&O services under each preventive (regular), corrective and extraordinary category.
    - Reporting on plant performance, system management, threats detection, power generation and distribution, forecasting, feedback, etc.
    - Training/coaching to the operator or relevant Organization personnel.
    - Monitoring reports.
    - Upon failure to provide stipulated services, the Organization may terminate the contract by securing financial, managerial and physical assets.

7.5.2 Remote monitoring

- Since Organization is a non-technical entity, the purpose of remote monitoring shall be aligned toward obtaining Operation and maintenance feedback regularly on whether or not the SMG is performing in accordance with expectations as promised by the installer company.
- Remote monitoring is a technically complex and relatively expensive facility, the Organization shall venture into it upon conducive situations only. Such situations can be categorized as:
    - SMG system is relatively bigger and technically complex to handle.
    - Remote monitoring is managerially, technically and economically viable.
    - Remote monitoring is a known mechanism to the Organization and the Organization is confident to go for it.
- The Organization shall employ a trustworthy service provider to supply required services upon obtaining a verdict by an assembly meeting.
- Together with LG/PG or a funding agency, the Organization shall work out key performance indicators (KPIs) on which the service provider has to perform essential tasks and report back before the bidding process. Some of the common performance indicators are listed in Figure 4.

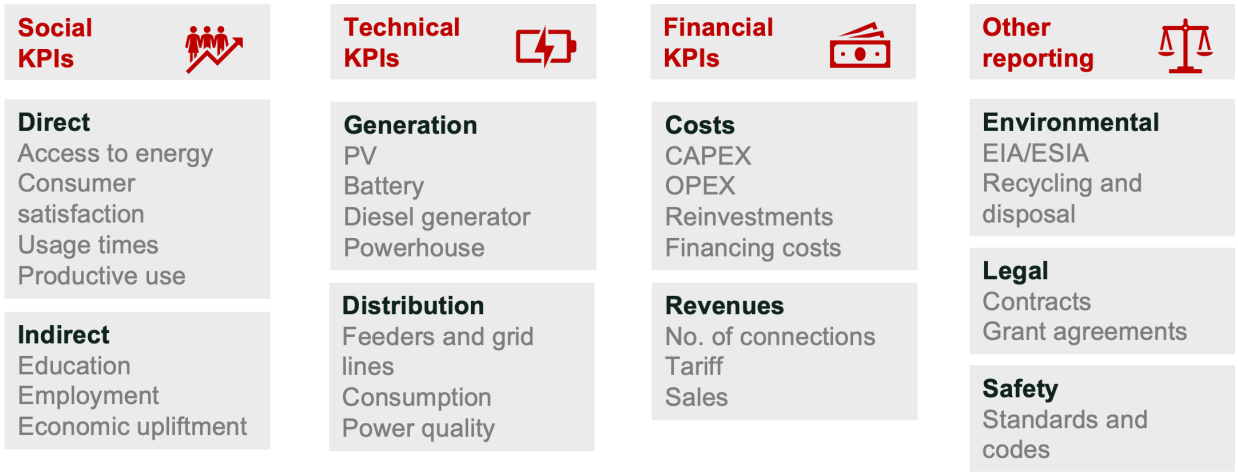


Figure 4: Potential areas to determine Key Performance Indicators (KPIs)

- A bidding process shall be conducted to select an appropriate service provider based on proposed KPIs, technology, service types, quantity, quality, timing, reporting, and cost of expected services.
- The organization shall set up modern data acquisition systems and platforms allowing remote monitoring capability by taking advice from pertinent experts to ensure technical interoperability between SMG and the service providers' operating platforms.

PART 8
KEY REFERENCES

- Cooperative Law 2074
- Cooperative Rules 2075
- Cooperative Organization Registration Guideline (*Digdarshan*), 2074
- Local Level UC formation, Management and Operation related Procedures 2074 (Model), MOFAGA
- Mini-Grids Special Program Procedure 2076
- Guideline for Cooperative Model of Mini/Micro Hydro, AEPC
- AEPC-RERL 2019 Solar Mini-Grid O&M Guideline, AEPC
- Operation and Maintenance, Best Practice Guideline, Africa Edition, Solar Power Europe
- Micro Hydro Construction & Installation Guideline, 2071, AEPC
- Energy 4 Impact, Mini-Grid Operations & Maintenance April 2020
- MSME operation directives 2077, Ministry of Industry, Commerce and Supplies

PART 9
ANNEXES

A.1 Features of the Technical Subcommittee

Formation

- As per the necessity, the Organization can form a Technical Subcommittee (TSC) through the assembly meeting.
- A 3-5 member TSC with members having the following ideal personal qualifications as given in Table 4 is suggested.

Table 4: Designations and qualifications of the Technical Subcommittee

Committee formation	Designation	Ideal personal qualifications
Designated Organization member	Coordinator	▪ Has prior experience with Solar PV systems or has obtained technical M&O training from technical institutions. ▪ Has passed the SLC examination at minimum.
Local government representative (preferably a technical person)	Member	▪ Has experience in SMG system operation and maintenance. ▪ Understands the overall technical issues of SMG and can provide advice.
A person with SMG's technical ideas (preferably local RE sector person)	Member	▪ Shall have an overall technical understanding of the SMGs. ▪ Can provide promotion and solution-oriented advice on technical matters.

Selection criteria

- TSC members shall be at least 18 years of age, not associated with criminal cases, not have government dues and not members of a similar Organizations.
- As far as possible, TSC shall be representative (by geographic area and expertise), socially inclusive (by gender and ethnicity), and politically neutral.
- TSC personnel shall be selected such that they can afford time for meetings, is enthusiastic to engage, and has technical ideas on PV system operation.
- Institutional users and PEU owners shall be given priority while selecting additional subcommittee members.
- When the TSC coordinator or member is unable to continue his/her responsibility, the Organization can nominate another suitable person immediately.

- In the case of LG representatives, the engineer or technical person designated by the LG shall be a member of the subcommittee.

Functions and authorities

- TSC members shall act as a volunteer, so shall not receive any salary from the Organization.
- Be accountable toward Organization and responsible for overall technical matters related to the SMG.
- Be responsible for the communication and linkage with the installer company, service providers, LG, Organization and other stakeholders through the coordinator.
- Provide recommendations for hiring and dismissal of technical human resources on a reasonable basis.
- Organize/provide needful training to organizational members, operators and general users as and when needed.
- Support Organization on planning and budgeting of technical activities.
- Analyse power generation, distribution and consumption trends and provide advice to Organization for necessary corrective actions.
- Monitor electricity leakage/misuse if any.
- Assess electricity demand forms and provide recommendations.
- Insist to prepare needful technical designs, manuals, operating tools, technical plans, innovations, experiments, studies, etc.
- Perform verifications and validation of technical work carried out by the installer company/service providers.
- Maintain separate meeting minute book under the control of the coordinator.
- Invite an independent expert/technical resource person to the TSC meeting when needed.
- Responsible to add/cut electricity supply to households or enterprises based on the capacity of the system.
- Responsible for load management of the system if the demand is very high.
- Provide technical input or recommendations to the management committee/cooperative for the replacement/ procurement of technical equipment.

Service period and remuneration

- From the date of formation, the service period of the TSC shall be for 4 years (i.e. the same duration as the Users Committee).
- The assembly meeting shall fulfil any TSC vacant position immediately.
- Until the new TSC does not take charge, the old TSC shall function as before.
- In case the subcommittee coordinator/member, as a volunteer, has to provide full/part-time services, he/she shall be provided suitable remuneration as decided by the Organization.
- This guideline does not restrict providing a suitable meeting allowance, transportation costs, food and accommodation costs as appropriate associated with the TSC meeting.

Meeting procedures

- TSC shall meet on a trimester basis at minimum. Additional meetings shall be organized based on emerging needs.

- The coordinator shall coordinate and call for the meeting 3 days before the meeting date, or fix the date in the preceding meeting.
- The coordinator shall lead the meeting and maintain the minute book.
- The subcommittee meeting shall comply with the 5-step meeting procedures that include preparations, call for the meeting, meeting conduct, minute taking, and closure as stated in the UC meeting procedures.

A.2 Features of Finance and Managerial Subcommittee

Formation

- As per the necessity, the Organization can form a Finance and Managerial Subcommittee (FMSC) through the assembly meeting.
- A 3-5 member FMSC with members having the following ideal personal qualifications as given in Table 5 is suggested.

Table 5: Designations and qualifications of the Finance and Managerial Subcommittee

Committee	Designation	Ideal personal qualification
Designated Organization member	Coordinator	▪ Has prior work experience in financial & managerial roles in any type of organization or, has commerce/accounting/management academic backgrounds. ▪ Has passed the SLC examination at minimum.
Local government representative (preferably staff working under the economic development section)	Member	▪ Has experience in financial management, economic development, fund mobilization, auditing, budgeting, etc. ▪ Can understand the overall financial and managerial issues of SMG and provide applicable advice.
A person with finance or management-related ideas (preferably a representative from a financial institution with which the UC has relations to)	Member	▪ Shall have banking, investment and enterprise-related understanding. ▪ Can provide promotion and solution-oriented advice on financial matters.

Selection criteria

- Institutional users, PEU-related users and locally reputed persons shall be given priority while selecting additional committee members.
- In the case of institutional representatives, the person designated by the institution shall be a member of the FMSC.
- The remaining criteria shall be as per the criteria established for the Technical Subcommittee members.

Functions and authorities

- Accountable toward Organization and responsible to facilitate overall financial and managerial matters related to the SMG.
- Responsible for the communication and linkage with the financial institutions, LG, UC and other stakeholders through its coordinator.
- Recommend Organization for hiring and firing of finance and managerial staff (Admin and Finance Manager) on a reasonable basis.

- Organize/provide needful training to the Organization members, accountant, administrative staff and general users as and when needed.
- Perform a periodic review, especially of staffing matters, assets, administration, compliance, accounting, planning, budgeting, grievances, income, expenditure, bank status, PEU status, etc., and provide feedback to Organization for needful corrective actions.
- Insist to prepare needful office management rules and tools (forms, formats), plans, posters, hoarding board, etc.
- Insist on adopting good practices from other similar SMGs on financial and management aspects.
- Perform verifications and validation of financial facts and figures reported by Admin and Finance staff.
- Maintain separate meeting minute book under the control of the coordinator.
- Responsible for financial activities like hiring/firing auditors, updating and financial closure of the organization.

Service period and remuneration

All the provisions set out for Technical Subcommittee above shall apply for FMSC as well.

Meeting procedures

All the provisions set out for the Technical Subcommittee above shall apply to FMSC as well.

A.3 Features of productive energy use

PEU promotion

- The Organization shall be eligible to promote PEU activities among the users based on the amount of energy generation, PEU potentials and managerial capacity.
- The Organization can establish a PEU fund to generate employment and income for users by establishing micro, small, and medium enterprises (MSMEs) at the local level.
- In case the PEU fund is established, a separate PEU fund mobilization rule shall be developed for the systematic operation of PEU activities.
- Upon significant growth of PEU activities, a separate PEU fund mobilization subcommittee can also be formed.
- The Organization shall mobilize PEU funds to eligible applicants as a loan. The interest rate for such a loan shall be always less than the interest rate offered by local savings/credit organizations.
- Preferably, MSMEs shall have their bank account and be registered with the local government so that they can get access to other government resources.
- MSMEs shall be eligible to obtain loans from the Organization upon fulfilling PEU-related rules.
- The Organization shall approve the loan amount based on the business development plan of the applicant/s.
- There shall be adequate energy generation to support additional PEU proposals.

PEU business plan

- The Organization shall provide loans as per the set procedures outlined in the approved PEU fund mobilization rule/bylaw.
- The Organization shall develop a user-friendly business plan template as an important part of the bylaw. The business plan template shall be designed by incorporating vital technical and financial information so that the Organization can properly evaluate the authenticity of the plan. Table 6 gives an indicative list of essential information to be included in the template.

Table 6: Indicative list of essential information to be included in the business plan

Technical information	Financial information
Applicant's information: Name, address, gender, age, education, family size, relevant experience, etc. **Enterprise backgrounds:** Title, plant location, start date, local demand, competitors, market, labour, raw materials, etc. **Enterprise objectives:** Annual/monthly production, quality of production, annual income, employment generation, etc. **Major activities:** Goods purchase, installation, training, production, packaging, selling, etc. **Energy requirement:** Consumption per day, hours of operation, optimum power input requirement.	**Total estimated cost:** Equipment, electricity, land, labour, transportation, installation charge, training, raw materials, overhead, etc. **Financial sources:** Self-investment, loans from organizations, loans from banks, government grants, etc.

Technical information	Financial information
Business approach: Sustainability, environmental implications, pricing, skill development, access to technology, quality control, access to market, access to microfinance, etc. **Coordination and linkage:** Local government, financial institutions, technical service providers. **Monitoring and supervision:** Responsibility, frequency, recording/documentation, quality control, accounting, etc.	

A.4 Indicative content for operator's training

Table 7 gives an indicative list of essential content to be included in the operator's training.

Table 7: Indicative content for operator's training

Topics of the training	Recommended focused areas
1) Periodic repair and maintenance procedure	Preventive, corrective, predictive and extraordinary maintenance.
2) PV modules handling procedures	Basic knowledge about the installed products (ex. handling, product-specific safety guidelines, maintenance techniques, etc.) Basic measurement skills (ex. thermography, voltage, current and power measurements)
3) Inverter and battery handling procedures	Function, type of inverter, inspection techniques, testing techniques, etc.
4) Introduction of hazardous electrical equipment	Electrical equipment that may exert electrical shock, asbestos (electrical insulator) handling, battery handling, etc. with safety measures for users, operators and maintenance workers.
5) Meter reading and system monitoring	Meter reading, calibration, data handling, billing techniques, and monitoring indicators.
6) Minor repair and maintenance	Transmission and Distribution lines, service wires, power sockets, switches, joints, etc.
7) Understanding of health and safety manual	Understanding of all provisions mentioned in the manual- both technical and managerial.
8) M&O Procedures	Health and safety, technical arrangements, managerial arrangements, PEU fund, Maintenance fund, spare parts, etc.
9) Environmental management procedures	SMG waste management procedures, surrounding environment, natural disasters, etc.
10) Emergency response procedures	Safety measures are to be taken at the time of fire, thunderstorms, landslides and floods; information about electricity outages (individual user, cluster or at the system level), communication at the time of theft and vandalism, etc.
11) Logbook handling procedures	General knowledge of electricity production (kWh), voltage (V), frequency (Hz), operation time (h), Logbook handling techniques; data reading and recording techniques, etc.
12) Reporting procedures	Daily, weekly, monthly and annual reporting templates.

A.5 Advance fund request form • Template

To

The Chairperson

……

……

Subject: Request for an advance fund

In order to carry out/conduct ……
……
……
…… I am requesting to issue an advance amount of Rs……(In words: ……).

I assure you that I will deliver procured goods/services by using advance funds together with associated bills and evidence. I will settle all used and unused funds as per the financial rules of the organization. In case of failure to settle, I am ready to undergo through the prevalent financial regulatory process of the country.

Requested by	Approved by
Signature……..…	Signature ……..……
Name ……..….	Name ……
Designation: ……	Designation: ……
Address ……	Address ……
Contact number …….....	Contact number ……..…
Date: ……	Date: ……

A.6 Advance fund clearance form • Template

An advance amount Rs………….. (In words…………………………………………...) issued to Mr/Ms………………………………………..for the purpose of ……… ………. ………………. …………… ……………… …… ……… …………………….. …………….. ……………..……. …………… ………… ……..……………………………………… has been settled as below.

Fund details

Advance fund Rs ………………….

Cheque No: ……………………….

Date: ……………………………....

Settlement details

Fund utilised Rs…………………………..

Fund returned: ……………………………

In bank account Rs ……………………….

In office: Rs ………..………………………..

Procured Goods/services: …………………………………… (Attach, if it is a long list).

Records verified by

Signature: …………………….

Name: ………………………..

Designation: ………………….

Date: …………………………..

Approved by

Signature: …………………………...

Name: ……………………………….

Designation: …………………………

Date: …………………………………

A.7 Compensation request form • Template

Particulars	Information provided by the claimant	Remarks
1. Name of claimant …….. Address…… ……..		
2. Short description of the properties to be compensated		
3. Description of property ownership (freehold, leasehold, contracted for a short period)		
4. Quantity of property		
5. Description of proof documents attached (*Larpurja,* map, photographs, receipts, citizenship, licence etc)		
6. Adverse matters (pipelines, canals, mine, track etc) associated with the property		
7. Any notices by local government or court affecting the property.		
8. Particulars of the claim (for the value of the property, health hazards, disturbance etc)		
9. Claim in terms of amount (NPR)		
10. Other Claims		

Claimant

Signature……

Name……

Contact number……

Solicitor

Signature……

Name ……

Address……..

Contact number……

A.8 Tariff collection receipt • Template

Receipt mo. ……..….. Date……

Name of user ……..

Identity number ……....

Address ……

Installed capacity (Watt) ……

With thanks, the electricity tariff paid by the above user for the month of …….. year ……. has been received as below.

	Description	Consumption Unit	Rate		Amount		Remarks
			Rs.	Pa.	Rs.	Pa.	
1.	Monthly minimum charge/ connection charge						
2.	Consumption charge						
3.	Amount due from the previous month						
4.	Penalty						
5.	Other charges……						
		Total amount					
		In words					

Note: Please fill up the customer card after collecting the tariff.

……

Receiver's Signature

Customer tariff card - template

Cover Page

User's ID…….

User's Name……...

Approved Capacity……

Address……

Fiscal Year……..

Customers Rules

…….

…….

…….

Payment Details

User's ID…….

FY……

Month	Amount	Adjustment	Total Bill Amount	Total amount (including dis-count and charges)	Receipt No.	Receivers' signature
Carried over from last FY						
Shrawan						
Bhadra						
Aswin						
Kartik						
Mangshir						
Poush						
Magh						
Falgun						
Chaitra						
Baisakh						
Jestha						
Ashad						

A.9 Operator's daily log book • Template

SN	Date/ Time	Generated power from PV (kW)	Battery state of charge (%)	Battery discharging power (kW)	Battery charging power drawn by battery (kW)	Current measurement (Cable)				Voltage (V)			
						R	Y	B	N	R-Y	Y-B	B-R	R-N

A.10 Periodic maintenance logbook • Template

Components	Actions Taken	Status/ Quantity	Action Date	M. Category (D,W,M,Y)	Comments	Operator's Signature
1. Solar Panel	*Cleaning of Solar Panels*	*It was dusty, now fully cleaned*	*10.9.2023*	*Weekly*	*Removed dust from a towel*	
2. Battery						
3. Charge Controller						
4. AC Inverter						
5. Main Meter						
6. Transmission and Distribution System						
7. User's Meter						
8. Other						

Note: Maintenance (M) category: D=Daily, W=Weekly, M= Monthly, Y= Yearly

Potential actions

- Recording: Electricity generation, duration of operation, temperature, voltage, current, noise, indicators, etc.
- Cleaning: Surrounding, electric components, equipment, solar panel, transformer, inverter, etc.
- Inspection: Animals or human invasion, poles, wires and joints, electrical enclosures, cable connections, drainage system, ground erosion of mount system, any stains at penetrations, corrosion in metallic parts, etc.
- Repair/maintenance: Any SMG components.

A.11 Land rental agreement • Sample

This land rent agreement is hereby executed at …….. *[Place]*……. on the …….. *[Date]*…….. day of ……. *[Month, Year]* …….between:

In the case of private property

[Name of land owner] son of…. [Father's name of land owner]……..permanent resident of …….. [Address of land owner]…… (Hereinafter referred to as first party/land owner) this term would include his/her heirs, successors, legal representatives and assigns etc.

In the case of provincial/federal government property

[Name of government agency]…….....under the ministry of……. [Name of Ministry]…… (Hereinafter referred to as first party/land owner) this term would include heirs, successors, legal representatives and assigns etc.

In the case of local government property

[Name of Local government]……..... of province …… (Hereinafter referred to as first party/land owner) this term would include heirs, successors, legal representatives and assigns, etc.

AND,

…… *[Name of Users committee/cooperative]……,* located at …….. *[Address of User's Committee/Cooperative]*…… (Hereinafter called the tenant/Second party) of the other part, which expression shall mean and include his heirs, successors, legal representatives and assigns etc.

The premise is in the possession of the owner who is the first party with …..*[Land registration No.]*……..and he/she has agreed to let out the said land as …. *[Monthly. Yearly]*…..rent basis to the second party /tenant.

NOW THIS AGREEMENT WITNESSETH AS UNDER: –

The … *[Monthly/Yearly]*…. rental of the agreed premises is agreed and fixed at Rs…… (In words……..), which does not include other charges.

This rental period is effective from…….*[Date]*…… till…….*[Date]*……

The tenant should deposit a sum of Rs…… (In words as the security amount, which will be refunded /adjusted at the time of vacating the said premises.

The tenant should use the premise for Solar Mini-Grid purposes only and not for other commercial purposes.

The tenant has no rights given to sub-let or art with a certain portion of the premise to any person.

In case the tenant fails to pay rent for … *[Duration]*……or more, then the land owner can ask the tenant to vacate the premise.

The tenant has to maintain the rented land properly and should not be distorted without consultation with the land owner.

The owner or any authorized person on his behalf has a right to inspect the rented residential premise at any time at a mutually convenient time.

In case the tenant decides to vacate the premise upon completion of the tenancy period then both the parties (landlord and tenant) should serve one month's notice to each other.

Whatever terms and conditions are mentioned in the rental agreement are abiding by both the parties and these terms and conditions are final. These agreed conditions are final and irrevocable.

First Party/Landowner	Second Party/Users Committee or Cooperative
Signature: …….	Signature: ……...
Name: ……..	Name: …….
Date: …….	Designation: ……..
	Date: ……..

A.12 Purchase order • Template

Purchase order no:
Decision no and date:
Date:

Name of person/organization requesting purchase order:
Address:
Contact No/Email:
Bank name and account No:
Payment procedure:
Purpose of the procurement:

SN	Item details					Cost Rs.		Re-marks
	Code no.	Name	Specification	Unit	Quan-tity	Rate	Total	
					Total			
					VAT (13%)			
					Gross total			

The procurer shall be entitled to deliver all goods by …… *[Date]* ……. including invoice, bills and associated documents.

Prepared by	Endorsed by	Approved by
……	……	……
Signature:	Signature:	Signature:
Name:	Name:	Name:
Designation:	Designation :	Designation:

A.13 Customer demand and registration forms • Templates

New customer demand form

To,

The Chairperson,

……

……

Subject: Request for electricity line connection and supply

I hereby request you to provide a new electricity line connection from the Solar Mini-grid. I assure you that I will abide by all the rules and regulations of the organization including the electricity tariff. My personal information and demand details are as follows:

SN	Description	
1.	Name of Applicant (Individual or institution)	
	In the case of Individuals:	
	Name of father/mother	
	Name of spouse	
	Name of grandfather/mother	
3.	Name of house owner	
4.	Purpose of electricity use (domestic/enterprise)	
5.	Name and address of electrician	
6.	Location of line to be connected (Tole, Ward no, local government)	
7.	Nearest pole number from the location	
8.	Demanded electricity energy	
9.	Type of connection if any (phases)	

I confirm that the above-mentioned information is correct, so will be responsible for any consequences occurred due to false information.

Applicant

……

Signature:

Name:

Designation (if applied for an institution)

Contact number:

New customer registration form

SN	Grand Father's name	Father's name	Husband or wife's name	Name of electricity user/member	Age	Address	Occupation

Number of shares purchased	Date of membership	Name of Nominee	Age	Address	Remarks

A.14 Record sheet of fixed assets • Template

Name of fixed asset:

Asset classification:

Identification number:

Date	Dispatch no./Issue no.	Specification No.	Description			
			Name of country and company of production	Size/Capacity	Useable duration (years)	Source agency

Income			Expense		Balance		Remarks
Quantity	Per unit cost	Total cost	Quantity	Total cost	Quantity	Total Cost	

A.15 Disconnection request form • Template

To
The Chairperson
……

Date: ……

Subject: Request for disconnection of electricity line

Because of my domestic affairs, I am not going to use electricity from the date …… so requesting you to disconnect the electricity line registered in my name.

1. Full name of customer……
2. Full name of his/her father……..
3. Customer ID:……
4. Customer address: District…… R/M……., Ward No. ……
   Tole……
5. Meter type: ……Watt……
6. Amount Rs……..

……
Receiver's Signature

There is no remaining due amount in the name of the customer.

……
Signature of Tariff Collector

The electricity line has been disconnected from the date……

The electricity line has not been disconnected on the date……due to……

……
Signature of Operator/Technician

All items in the possession of the customer have been recovered.

…….
Signature of Storekeeper

…….
Signature of Treasurer

Approved by

……
Chairperson

A.16 Application for position change (of line and meter box) • Template

To

Date: ……

The Chairperson

I, ... resident of district.....R/M, Tole…… want to change the position of the line/meter box as per the below description.

SN	Description	
1	Full name of customer	
2	Citizenship no. and name of issuing office	
3	Customer number	
4	Approved load	..... Amp .....kW .....Phase
5	Purpose of electricity use (domestic, institutional, industrial)	
6	Hose address of the existing connection	Tole..... Ward No. ..... R/M ..... District .....

Above electricity line description belongs to me. I am in need to change the position of the meter box/line to fulfil my purpose. I assure you that I have cleared all payments till the date of .... and request for the change of Meter box in new /line in the new position.

Applicant

…….

(Signature)

Telephone/Mobile …….

Customer ID……...

Address ……..…

A.17 Staff salary payment slip • Template

Date……

Pay slip for the month …… Year ……

Name of employee……

Designation of the employee……..

Working days…… Absent…….. Leave days……..

Earning	Amount NPR	Deduction	Amount
Monthly Salary		Income Tax	
Allowance		Savings	
Overtime		Other (Specify)	
Total			

Amount Received Rs……

In words ……

……

(Signature of Recipient)

……

(Signature of Payer)

A.18 Goods requisition form • Template

Fiscal Year……

Demand No……

Date……

S.N	Name of Goods	Specification	Demand		Remarks
			Unit	Quantity	
1	2	3	4	5	6

a) Purchase from the market and provide.
b) Provide from the stock

…….. (Signature of Requester)

Name……..

Date……..

…….. (Signature of Recommender)

Name……..

Date……..

…… (Signature of Authorised Official)

Date……

Name……

…….. (Signature of Storekeeper)

Date……

Name……

A.19 M&E checklist for provincial and local government

Part A: Checklist

Key Monitoring Indicators	(Yes, No)	Illustration/ Remarks/ Status/ Discussion Points
a. Institutional Aspects		
1. Organization identity		
2. Registration status		
3. Possession of M&O Bylaws		
4. Functioning of User's organization		
5. Formation of sub-committees		
6. Regularity of UO meetings		
7. Regularity of Subcommittee meetings		
8. Possession of handover/takeover documents		
9. Possession of books of accounts		
10. Maintenance of Minute books		
11. Working staff		
b. Financial Aspects		
1. SMG support agency or partnership		
2. Accounting procedures		
3. Bookkeeping procedures		
4. Procurement procedures		
5. Tariff value and structure		
6. Tariff collection procedure		
7. Bank account operation		
8. Annual income		
9. Annual expenditure		
10. Saving credit activities		
11. PEU activities		
12. Audit exercises (regular and public)		

Key Monitoring Indicators	(Yes, No)	Illustration/ Remarks/ Status/ Discussion Points
c. Technical aspects		
1. Sufficiency of system capacity		
2. Existence of operator		
3. Normal power production and supply		
4. Transmission & Distribution lines		
5. Training to operators		
6. Installer Company (IC)		
7. Quality of services by IC		
8. Daily activities of the operator		
9. Repair and maintenance fund		
10. Service providers		
11. Spare parts		
12. Responsible person for Repair and maintenance.		
13. Safety measures		
d. Other aspects		
1. The role played by local government		
2. The role played by the provincial government		
3. Reporting to LG and PG		
4. Environmental protection		
5. Security status of fixed assets		
6. Energy demand-supply situation		
7. Possibility of NEA net metering		
8. Remote monitoring status		

Part B

User's general issues and concerns:

1. *[list the general issues and concerns]*
2. *[list the general issues and concerns]*

Issues to be addressed by LG/PG:

1. *[list the general issues and concerns]*
2. *[list the general issues and concerns]*

A.20 General outline for employee management manual

Part 1: Name and commencement, definitions, right to explain, etc.

Part 2: Name and type of regular positions, temporary positions, levels, education and qualification, recruitment committee, role and responsibility of recruitment committee, examination types and process, appointment letter, terms of reference, etc.

Part 3: Delegation of authority, promotion, criteria for performance appraisal and process, training, etc.

Part 4: Staff: Salary scale, allowance, overtime, *Dashain* (festival) allowance, mode of payment, salary payment schedule, saving provisions, travel allowance, daily allowance, treatment allowances, etc. Non-staff: Meeting allowance, travel allowance, daily allowance, etc.

Part 5: Retirement criteria, retirement allowance, resignation procedure, advance salary, handover takeover procedures, etc.

Part 6: Office time, attendance, type of leaves and provisions (casual, home, sick, maternity, mourning etc), leave application and approval, leave accumulation provisions, salary deduction upon undue absents, leave records, etc.

Part 7. Organizational discipline, punishment, rewards, warning upon wrongdoing, sacking from the work, the opportunity for clarification, appeal, eligibility to reapply in new vacancy, salary in the case of punishment, records of punishments, general code of conduct, the integrity of the organization, security of staff, etc.

Part 8. Health and safety measures.

Part 9: Annexes with forms and formats.

A.21 General outline for user's organization bylaws

Preamble

Part 1: Name and commencement, definition, stamp, office, etc.

Part 2: Broad objective of the organization, specific objectives, major activities, etc.

Part 3: Eligibility criteria for the user membership, membership fee, condition for dismissal of membership, etc.

Part 4: General assembly, special general assembly, role and responsibility of general assembly, formation of user's organization, the regular meeting of user's organization, roles and responsibility of user's organization, etc.

Part 5: Roles and responsibilities of chairperson, roles and responsibilities of secretary, roles and responsibilities of treasurer, roles and responsibilities of user member, formation and responsibility of technical subcommittee, formation and role and responsibility of finance and managerial subcommittee, etc.

Part 6: Sources of income, records of fixed and recurring assets, fund of organization, bank account, audit, payment procedures, procurement procedures, etc.

Part 7: Selection of users committee executives and members, the vote of no confidence, resignation, amendment of this bylaw, right to give punishment to users, stamp model, etc.

Part 8: Roles and responsibilities of SMG Installer Company, management and operation, tariff setting and collection, hiring service providers, health and safety measures, provisions for electricity use, etc.

Part 9: List of SMG users.

A.22 Self-monitoring indicators and measurement methods

Technical Key Performance Indicators (KPIs)

Component	Indicator	Value	Calculation Method
Solar PV Panels	General physical condition	Good, needs cleaning, needs repairs	Physical direct inspection by the operator
Battery	Temperature	Degree C	From the inverter's display panel or separate installed temperature sensor
	Remaining life expectancy	Number of cycles	From the inverter's display panel
Powerhouse	General condition	Good, needs cleaning, needs repairs	Physical inspection
	Cooling system	Degree C	Reading from the temperature sensor
Distribution Network	Condition of the grid (poles and cables)	Good, needs cleaning, needs repairs	Physical inspection and recording of issues with pole number and wire between relevant pole numbers
	Condition of meters	Good, needs cleaning, needs repairs	Physical inspection and recording of issues with the meter number
	Voltage drop at the longest feeder	Voltage in V	Difference between the voltage measured at powerhouse outgoing cable and end of the longest feeder.

Financial and Economic KPIs

Component	Indicator	Value	Calculation Method
Revenue	Revenue (Actual – Predicted)	The total value of collected revenue – Projected revenue	The sum of all bills that have been paid minus the projected revenue from project design documents (or last year's value).
	Bills	Number and value of outstanding bills	Total number of outstanding bills and the total cumulative value of outstanding bills.
Costs	O&M	Amount in NPR/year	The sum of all O&M costs. Can also be compared between the different years and/or compared with initial project O&M.
Cash flow	Inflow – Outflow	Amount in NRP/year	Difference of income (from tariff and other revenues) and expenditures (O&M and other costs). The cash flow is the actual money that was received or paid out. It represents the ability of the committee to

Component	Indicator	Value	Calculation Method
			have cash at hand in case of positive cash flow.
Productive Users	% PEU in consumer's connection	%	100 x (Number of PEU connections / Total expected PEU connections). The value represents what % of PEU connection (and indirect sales via PEU) have been achieved by the project so far.

Social KPIs

Component	Indicator	Value	Calculation Method
Connections	Number of connections	# of connections by consumer type	The sum of all active connections (that have functioning meters) categorized via consumer types.
Complaint	# of complaints per year	# of complaints received in a year	The sum of all instances of complaints received by the operator or other committee representatives.
	Resolutions	%	100 x (# of resolved complaints / # of total complaints received)

Management KPIs

Component	Indicator	Value	Calculation Method
Meeting	Frequency	# of meetings	Compare # of actual meetings conducted vs planned meetings.
	Regularity	% of meetings on the scheduled time	100 x (# of meetings held on time / total # of meetings)
Staff	Compliance	Overall observation	Consider the number of complaints received, the performance of duties as per the job description/contract and the fulfilment of other agreed obligations.
	Performance of staff	Overall observation	Overall assessment of the performance of salaried or hired staff. Long-term retention of staff vs frequent need to change, etc.

A.23 Mini-grid tariff calculation tool • Model

Tool application notes:

- To be produced in Excel sheet with formula.
- For Operation Expenses (OPEX) based systems (to recover operational expenses only).
- The value given below are only representative and should be adapted for specific cases.

Annual Expenses	NPR/year		Legend
Staff	180,000		Input Cell
Materials	200,000		Intermediate Cell
Land Lease	50,000		Output Cell
Logistics	50,000		
Third-Party Service Provider	600,000		
Monitoring System Software	100,000		
Other 1	-		
Other 2	-		
Total	**1,180,000**	A: Sum of above	

Planned Reserve	10%	B
Target Earnings	**1,298,000**	C = A x (1+B)

	D	E	F= D x E
Energy Consumption	**Number of connections (#)**	**Average demand per consumer (kWh/year)**	**Sub-total (kWh/year)**
Residential	300	110	32,850
Commercial	30	329	9,855
Public	10	548	5,475
Productive	10	1,278	12,775
Other 1			-
Other 2			-
Other 3			-
Total	**350.00**		**60,955**

Revenues	F Monthly charges (NPR/consumer)	G Tariff (NPR/kWh)	H = D x F x 12 + D x E x G Sub-total (NPR/year)
Residential	50	10	508,500
Commercial	100	20	233,100
Public	50	10	60,750
Productive	200	30	407,250
Other 1			-
Other 2			-
Other 3			-
Total			**1,209,600**

Summary Finances	NPR/year
Target Earnings	**1,298,000**
Projected Earnings	**1,209,600**

Government of Nepal
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