



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

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Zusammenarbeit (GIZ) GmbH

IMPLEMENTATION PROCESS GUIDELINE FOR GRID-CONNECTED SOLAR PV SYSTEMS

*Implementation of subsidy-supported systems under Nepal's
Subsidy Delivery Mechanism, 2079 B.S.*

For use by units of the Local Government, Provincial Government, and
Federal Government

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Acronyms

AC	Alternating current
AEPC	Alternative Energy Promotion Centre
B.S.	Bikram Sambat
CAPEX	Capital expenditure
DC	Direct current
DFS	Detailed feasibility study
EPC	Engineering, procurement, and construction contract
ESMF	Environment and social management framework
FY	Fiscal year
kW	Kilowatt
LG	Local Government
NEA	Nepal Electricity Authority
OPEX	Operating expenses
PFS	Pre-feasibility study
RETS	Renewable Energy Test Station
RfP	Request for proposal
SEF	Stakeholders engagement framework
SRC	Subsidy Review Committee
TRC	Technical Review Committee

1. ABOUT

This document provides comprehensive up-to-date guidance on AEPC's implementation procedures for subsidy-supported solar PV systems in Nepal. It outlines briefly the system design and related policies while referencing all relevant templates.

The processes presented here have been evolved over the years. They offer the best available fit between simplicity, transparency and clarity of roles apart from maintaining consistency with the prevailing federal rules and regulations concerning the implementation of renewable energy projects.

Representing a good practice approach, it is hoped that these processes may serve Local Governments, Provincial Governments and private developers as reference in the implementation of projects and as benchmark for formulating their own processes. Wider adoption of these procedures would foster a unified approach across the different levels of governance, which is what AEPC seeks to inspire with this publication.

2. USERS OF THIS GUIDELINE

The process chart that has been mapped is for projects supported by the Government of Nepal and in alignment with the Renewable Energy Subsidy Policy, 2078 B.S.

Note: Projects entirely developed and implemented by the private sector have not been mapped. However, various stages of the process map are relevant to the private sector for project execution.

The users that will benefit from project implementation process documents are described in the table below.

Table 1: Target audiences

Government	<ul style="list-style-type: none">▪ Aligned with the processes defined by the Alternative Energy Promotion Centre (AEPC) under the Subsidy Delivery Mechanism, 2079 B.S., the federal, provincial, and local governments can and should follow this guideline to implement solar grid-connected projects.▪ The responsible entity for each stage and document is defined in Figure 3.
Private companies	<p>Private companies who bid on and construct solar grid-connected projects can and should follow this guideline to align with requirements and improve service delivery.</p> <p>The responsible entity for each stage and document is defined in Figure 3.</p>

3. INTRODUCTION OF SOLAR GRID-CONNECTED SYSTEMS

The cumulative installed capacity of solar grid-connected systems reached 10,080 kW in FY 2021/2022¹. Almost all solar grid-connected systems mentioned in the figure are subsidy-driven. In the Renewable Energy Subsidy Policy (2078) document, the installation of solar grid-connected systems larger than 1,500 W_p for commercial purposes can get a financial incentive of 50% interest buydown subsidy for 5 years of the bank loan term. These systems shall contribute to a minimum 51% self-consumption of the annual solar photovoltaic energy (in case of net-metering).

Similarly, systems larger than 500 W_p for households can get a financial incentive of 75% interest buydown for 5 years of the bank loan term.

Solar grid-connected systems in Nepal have gained popularity in recent years as a reliable and sustainable source of electricity. They are a cost-effective solution for households, businesses, and institutions seeking to reduce their dependence on the national grid and lower their energy costs.

Here are some key points about solar grid-connected systems in Nepal:

- **Government initiatives:** The Government of Nepal has implemented various policies and initiatives to promote the use of solar grid-connected systems in Nepal. The Alternative Energy Promotion Centre (AEPCC) is a government line agency responsible for promoting renewable energy, including solar grid-connected systems.
- **Net metering:** If solar grid-connected systems are designed with the purpose of net metering, the excess electricity generated is fed back into the national grid (managed by Nepal Electricity Authority), and the owner receives credits for the surplus power. Nepal Electricity Authority (NEA) will then settle the balance of imported and exported energy to the grid.
- **Licensing and approvals:** For solar grid-connected systems less than 1 MW, it is up to the developer and respective stakeholders to conduct feasibility studies complying with the Environmental and Social Management Framework (ESMF) and Stakeholders Engagement Framework (SEF). Upon construction, the system needs to be approved by the Renewable Energy Test Station (RETS) before applying for net-metering with NEA. For systems larger than 1 MW, the process requires a separate step of licensing and approvals, for example, survey license, generation license, etc. However, for the purpose of this process guideline, the scope is limited to systems less than 1 MW.
- **Incentives and subsidies:** The government provides subsidies to encourage the deployment of solar grid-connected systems. The AEPCC facilitates the subsidy incentive, and interested private or public companies can apply for it.
- **Solar installers and suppliers:** Several solar installation engineering, procurement, and construction (EPC) companies in Nepal offer solar grid-connected solutions. The developers

¹ AEPCC (2022), "Progress at a Glance: Year in Review", Kathmandu

choose installers who have experience and expertise in solar installations. They can provide system sizing, design, and after-sales services.

Nepal has been facing challenges in grid stability and intermittent power supply. Solar grid-connected systems can help alleviate these issues by reducing the strain on the national grid and providing a reliable source of electricity. The cost of installing a system depends on factors such as system size, quality of components, and standard installation. However, with the availability of government interest subsidies and long-term savings on electricity bills, solar installations can offer a favourable return on investment over the system's lifespan.

4. BRIEF ON SYSTEM ARCHITECTURE

This section briefly describes the general architecture of solar grid-connected systems.

Note: The sample shown in this section is illustrative only and not to advise of a specific system design. In every case, the appropriate architecture must be determined through a feasibility study specific to a given project site. The information given in this section is to provide only a general overview of solar grid-connected architecture.

Figure 1 shows the typical architecture of a solar grid-connected system. A grid-connected solar system is a type of solar energy system that is connected to the utility power grid. It consists of several key components like solar PV modules, grid-connected inverters, bi-directional meters, etc., working together to generate electricity from solar energy for,

- i) Self-consumption entirely, or
- ii) Grid feed-in entirely, or
- iii) Self-consumption and grid feed-in.

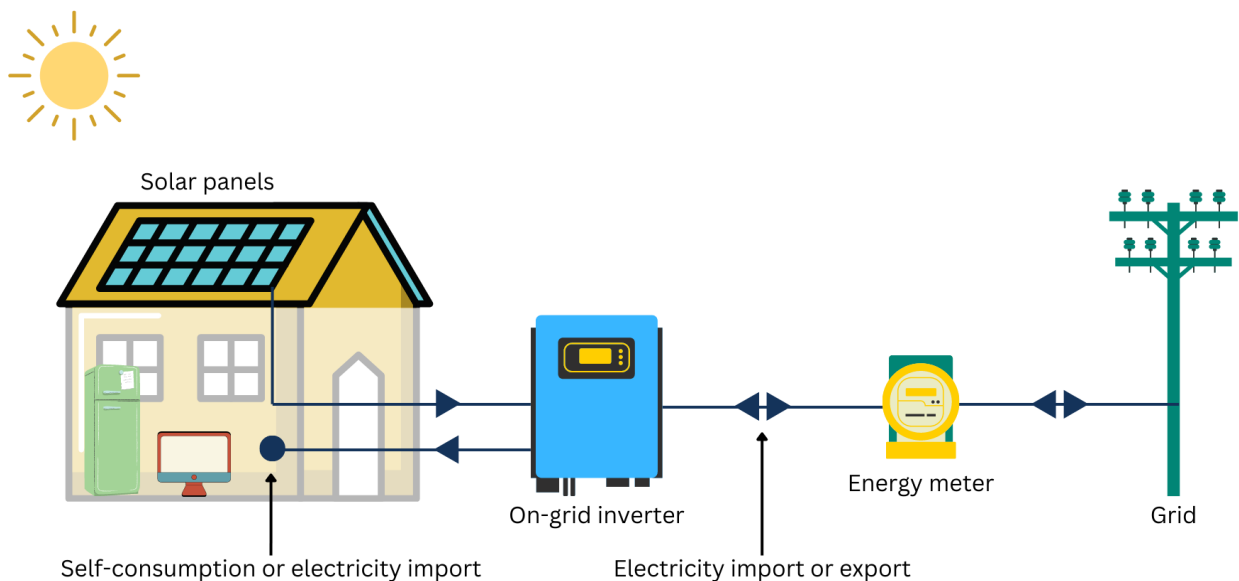


Figure 1: Solar grid-connected architecture

5. PROJECT MODALITIES

Within the interest subsidy modalities defined in the Renewable Energy Subsidy Policy, 2078 B.S., Figure 2 describes support for (i) household and (ii) commercial & industrial applications. It defines conditions, ownership, capacity, and subsidy for both categories. This process guideline covers both categories.

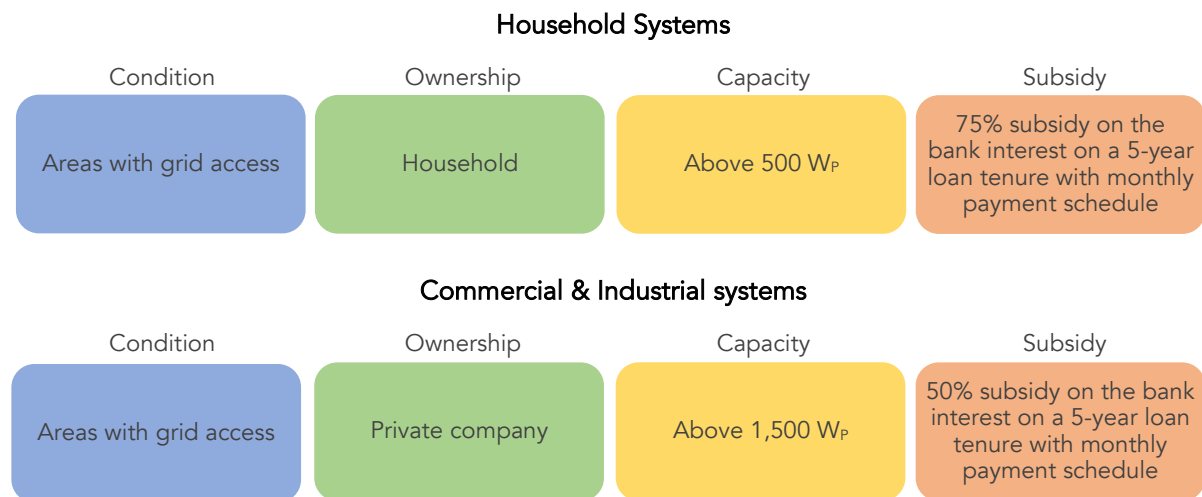


Figure 2: Interest subsidy modalities : Renewable Energy Subsidy Policy, 2078 B.S.

6. SUBSIDY DELIVERY MECHANISM

The subsidy delivery mechanism is summarized from the Renewable Energy Subsidy Delivery Mechanism, 2079 B.S.

The project developer will have to obtain a cost proposal of the solar grid-connected system from a pre-qualified company listed by AEPC. The developer will then have to submit the cost proposal and other documents required by the bank for loan processing. If approved, the bank will sign a loan agreement with the developer where the loan period has to be a maximum of 5 years. Once the loan is approved, the developer cannot change the company it has initially consulted with.

Once the system is installed, the company will have to submit a project completion report to the bank and the AEPC. Upon approval of the project completion report, the bank will disburse the loan to the developer or the company. The bank cannot add additional service fees or increase the interest rate and has to follow the conditions of the loan agreement.

The bank will then collect instalments from the developer as per the loan agreement and is entitled to receive the subsidised interest amount from AEPC upon submission of reports. Throughout this process, the bank is fully responsible for the sanctioning of loans and their collection.

7. STEP-BY-STEP PROCESS

Figure 3 shows the flowchart of the solar grid-connected project implementation process. The process begins with a demand call and follows through until the project is constructed and operational – ending with net-metering installation. In Figure 3, in addition, to the right side of the flowchart, the documents related to each stage are defined.

Complementary to the flowchart in Figure 3, Table 2 gives a more detailed overview of the documents which are required for each of the government-supported projects.

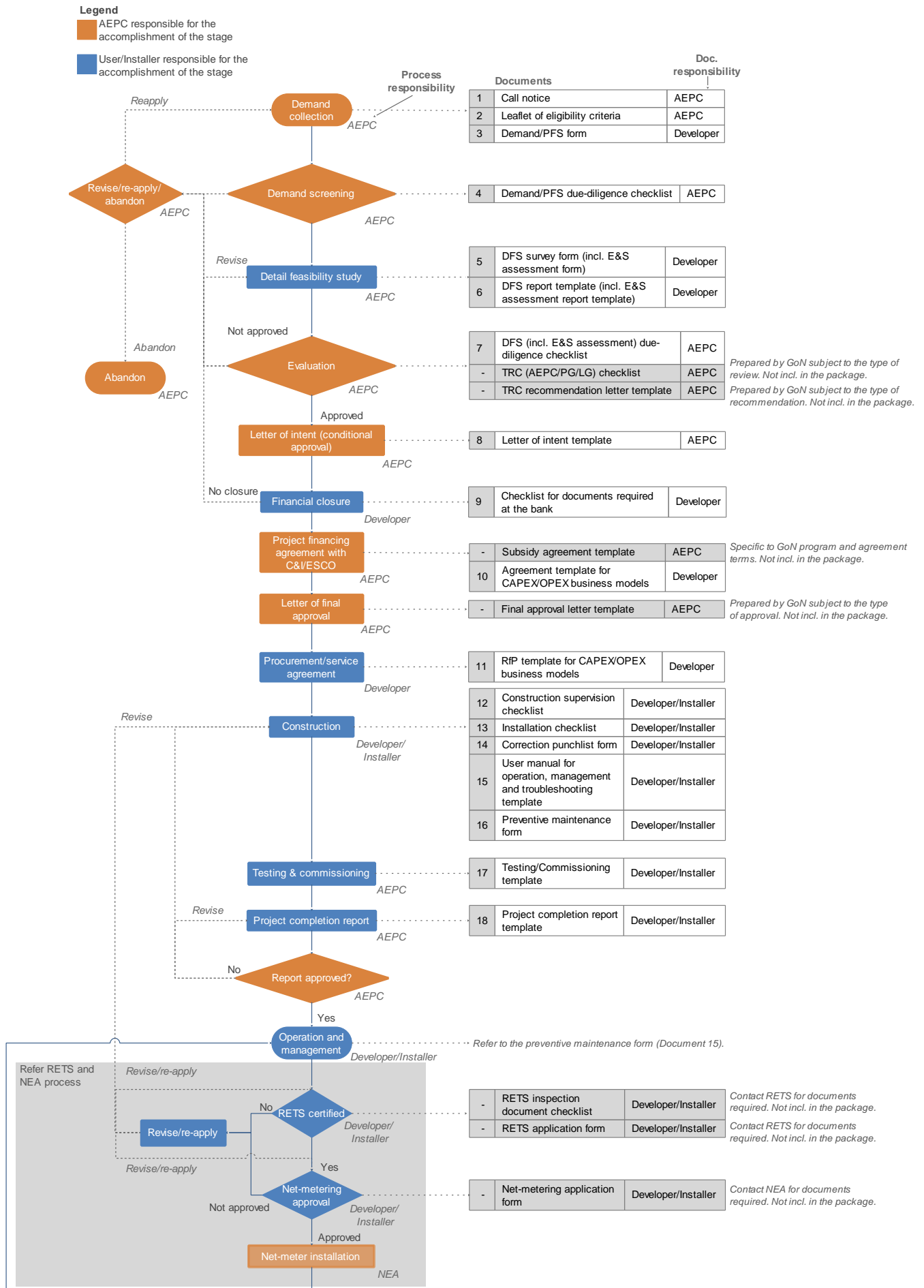


Figure 3: Process flowchart for government-supported solar grid-connected systems

Table 2: Detailed process description

Process name	Doc. no.	Document	Description
Demand collection	1	Call notice	Template for demand call by the government.
	2	Leaflet of eligibility criteria	Leaflet to be used by the government for simplified guidance to the applicants.
	3	Demand/PFS form	Demand form to be filled by the applicant.
Demand screening	4	Demand/PFS due-diligence checklist	Due diligence checklist used by AEPC to verify the quality of the information in the demand form.
Detailed feasibility study	5	DFS survey form	DFS survey format to be used by private companies developing projects
	6	DFS report template	DFS report format to be used by private companies for pre-feasibility assessment
Evaluation	7	DFS due-diligence checklist	Due diligence checklist used by AEPC to verify the quality and outcome of the DFS.
		Evaluation checklist	Prepared by AEPC subject to the type of review. Not included in the package.
		Evaluation recommendation letter template	Prepared by AEPC subject to the type of recommendation. Not included in the package.
Letter of intent (conditional approval)	8	Letter of intent template	A letter issued by AEPC as a confirmation for the private company to proceed with financial closure.
Financial closure	9	Checklist for documents required for loan processing required at the bank	A general list of documents that the private company needs to prepare for banks
Project financing agreement with C&I/ESCO	10	Subsidy agreement template	Specific to AEPC program and agreement terms. Not included in the package.
		Agreement template for CAPEX/OPEX business models	An agreement template between private company and vendors for CAPEX/OPEX business models.
Letter of final approval		Final approval letter template	Prepared by AEPC subject to the type of approval. Not included in the package.
Procurement/ser vice agreement	11	RfP template for CAPEX/OPEX business models	A RfP template between private companies and vendors for CAPEX/OPEX business models.
	12	Construction supervision checklist	A construction supervision checklist is to be used by the private company or government for supervision during construction.

Construction	13	Installation checklist	An installation checklist is to be used by the private company to ensure systematic and quality workmanship.
	14	Correction punch list form	A correction punch list is to be used by engineers of the private company or AEPC to give a list of items to be rectified during installation supervision.
	15	User manual template for operation, management, and troubleshooting	The template on user manual for operation & troubleshooting is to be prepared by the private company specific to the project site and handed over to the operator to ensure adequate knowledge of the operator for system operation and basic troubleshooting.
	16	Preventive maintenance form	A preventive maintenance checklist is to be used by the installer (subject to agreement on after-sales service) to ensure that the system is operating smoothly.
Testing & commissioning	17	Testing & commissioning template	A testing and commissioning template is to be used by the private company and AEPC for the installation.
Project completion report	18	Project completion report template	A project completion report template is to be used by the private company for submission to AEPC.
Operation and management			Refer to the preventive maintenance form (Document 15).
RETS certified		RETS inspection document checklist	Contact RETS for the documents required. Not included in the package.
		RETS application form	Contact RETS for the documents required. Not included in the package.
Net-metering approval		Net-metering application form	Contact NEA for the documents required. Not included in the package.

8. ANNEXES

Annex 1	Call of notice for installation of solar rooftop systems
Annex 2	Leaflet of eligibility criteria
Annex 3	Demand/Pre-feasibility study form (AEPC)
Annex 4	Demand/Pre-feasibility study due-diligence checklist
Annex 5	Detailed feasibility study survey form
Annex 6	Detailed feasibility study report • Template
Annex 7	Detailed feasibility study due-diligence checklist
Annex 8	Letter of intent • Template
Annex 9	Checklist for loan processing documents required at the bank
Annex 10	Agreement for CAPEX • Template
Annex 11	Request for proposal for CAPEX/OPEX business models • Template
Annex 12	Construction supervision checklist
Annex 13	Installation checklist
Annex 14	Correction punch list form
Annex 15	User manual for operation, management, and troubleshooting • Template
Annex 16	Preventive maintenance form
Annex 17	Testing and commissioning checklist • Template
Annex 18	Project completion report • Template



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