



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 SOLAR WATER PUMPING 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
DC	Direct current
DFS	Detailed feasibility study
EPC	Engineering, procurement, and construction contract
FY	Fiscal year
IWMI	International Water Management Institute
kW	Kilowatt
LG	Local government
SDW	Solar drinking water
SIP	Solar irrigation pumps
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 process map 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 water pumping 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 water pumping projects can and should follow these guidelines 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 WATER PUMPING SYSTEMS

The cumulative number of solar water pumping (SWP) systems for drinking and irrigation reached 3,129 by the fiscal year 2021/2022¹.

The SWPs implemented have no battery backup and are off-grid as subsidy eligibility is limited to off-grid systems. Only recently, with the expansion of the national grid, grid-connected SWP has been on the radar of research institutions which are exploring the implementation of grid-connected SWP in coordination with AEPC and Nepal Electricity Authority (NEA). Furthermore, common SWP systems implemented are AC (alternating current) pumps while DC (direct current) pumps are installed as well.

One of the applications of SWPs is irrigation, for which it is termed solar irrigation pumps (SIP). The major driver for SIPs is the subsidy from AEPC. The subsidies are dispersed via a demand-driven model where demand is collected from needy farmers through the local governments.

4. BRIEF ON SYSTEM ARCHITECTURE

This section briefly describes the general architecture of solar water pumping 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 water pumping architecture.

Figure 1 shows the architecture of a pure off-grid solar water pump. The term ‘pure’ here means that solar PV is the only source of energy generation in these systems without grid connection. However, grid-interactive solar pump controllers are also on the market.

In general practice, this architecture is adopted in the following site conditions,

- i) Where the grid access is not foreseen for the duration of the design life of the solar water pump.
- ii) Where there is a basic need and potential for the economic prosperity of the user(s) by utilising water for drinking water or irrigation.

¹ AEPC (2021/2022), "Progress at Glance: Year in Review FY 2078/2079 "

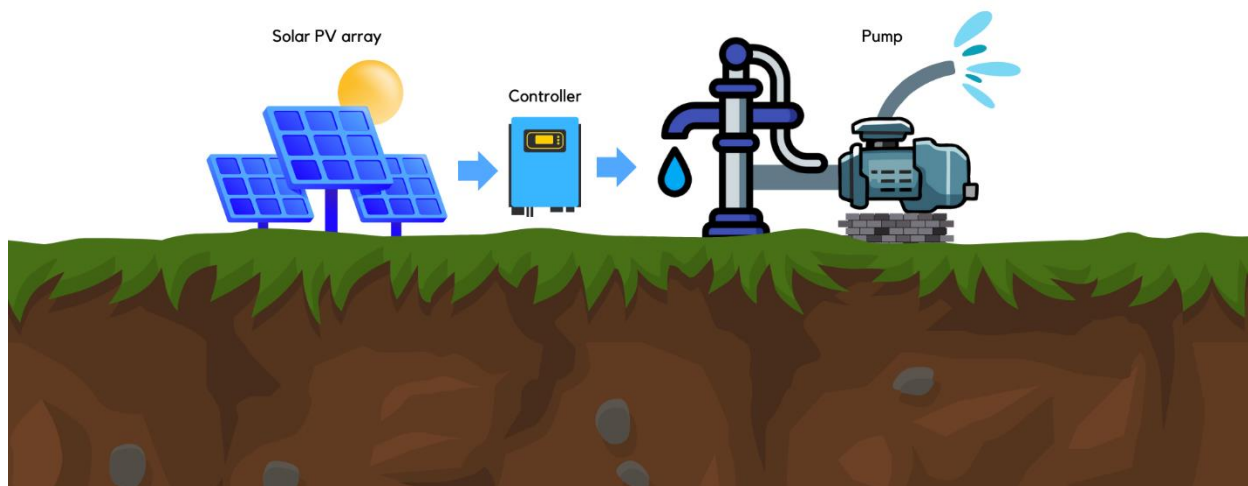


Figure 1: Purely off-grid solar water pump architecture

5. PROJECT MODALITIES

Within the subsidy modalities defined in the Renewable Energy Subsidy Policy, 2078 B.S., Figure 2 describes support for two applications of solar water pumping systems: (i) drinking water and, (ii) irrigation. It defines the conditions, ownership, and subsidy for both categories. This process guideline covers both categories.

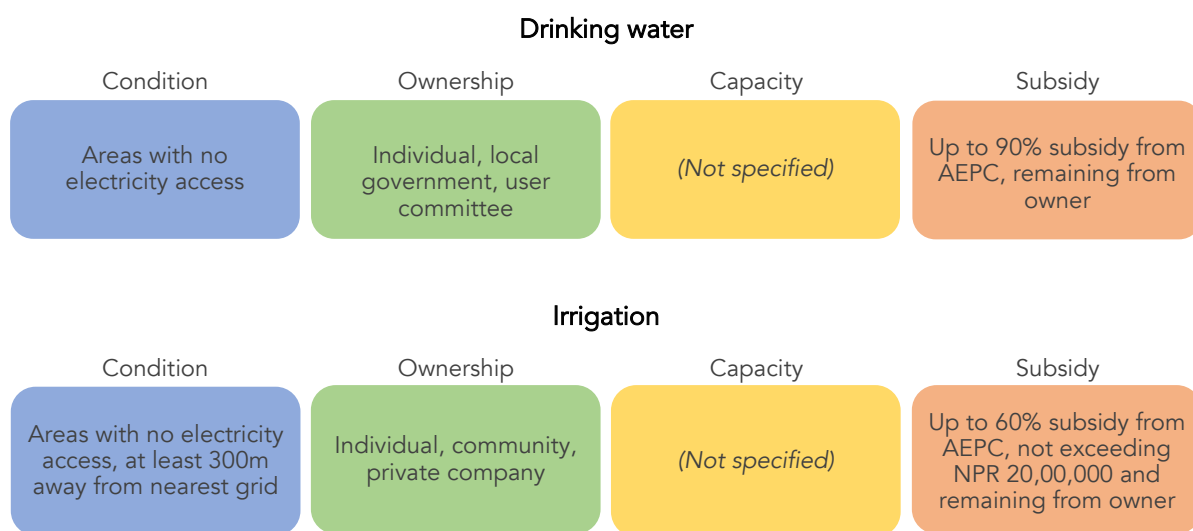


Figure 2: Subsidy modalities: Renewable Energy Subsidy Policy, 2078 B.S.

6. SUBSIDY DELIVERY MECHANISM

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

6.1 Drinking water

Every year, AEPC will coordinate with sub-national governments to collect demand by issuing a public notice. Either individuals, registered user committees, or community organisations can fill out the demand application and shall also submit a recommendation letter from the local government confirming the commitment to contribute the remaining cost besides the subsidy amount.

After reviewing the demand applications, AEPC will publish the selected applications quarterly. AEPC will conduct a feasibility study of the selected applications.

The feasibility study will be evaluated by the Technical Review Committee (TRC) comprising of the following members:

- Head of the respective department – Coordinator
- Technical representative (engineer), Ministry – Member
- Representative, Nepal Electricity Authority – Member
- Representative, Academic institution – Member
- Representative, Renewable Energy Test Station – Member
- Officer of the respective department – Member Secretary

Upon review from the committee, a recommendation will be made to AEPC. If the project is approved, the applicant will have to confirm the commitment of their contribution to the project (remaining amount besides the subsidy) and submit documented evidence of the source and purpose. All procurement activities will have to comply with the Public Procurement Act of Nepal. Upon completion of the construction, the installer company has to submit a project completion report to AEPC. After review of the project construction, AEPC will hand over the project to the project promoter and recommend subsidy disbursement. AEPC will recommend the Central Renewable Energy Fund (CREF) to disburse the subsidy after retaining 10% of the amount.

After 2 years of installation and subject to monitoring and evaluation by AEPC or sub-national governments, AEPC will recommend CREF to disburse the 10% retention amount. AEPC may use a remote monitoring system to monitor the performance of the system.

6.2 Irrigation

For individuals to be eligible for a government-supported solar water pump for irrigation, the individual will have to provide proof of ownership of the agricultural land. If a private company is applying, then the company has to provide proof of the company's land ownership or lease agreement of the agricultural land. For a community-owned system, the user committee has to be registered as per local laws. The agriculture land has to be owned or leased to a member of the user committee with proof of land registration certificate. If the

individual applicant is not the landowner, then they must submit proof of *bhogadhikaar* of the land recommended by the local government.

Every year, AEPC will coordinate with sub-national governments to collect demand by issuing a public notice. Either individuals, registered user committees, or private companies can fill out the demand application and shall also submit a recommendation letter from the local government confirming the need for solar pumps for irrigation.

After reviewing the demand applications, AEPC will publish the selected applications on its website. For applications from private companies, a detailed feasibility study has to be conducted by the private companies themselves which will be reviewed by AEPC. However, for system costs up to NPR 5,00,000, a preliminary feasibility study shall suffice. For community-owned projects, AEPC or the user committee can conduct a detailed feasibility study.

Similarly, the Technical Review Committee (TRC) will review the detailed feasibility study and make a recommendation. For applications from private companies, the applicant will have to confirm the commitment of their contribution to the project (remaining amount besides the subsidy). All procurement activities will have to comply with the Public Procurement Act of Nepal and the applicant shall install the solar water pumping system through one of AEPC's pre-qualified solar companies. For community-owned projects, AEPC or the local government can conduct procurement if such a request is received from the user committee.

Upon completion of the construction, the installer has to submit a project completion report to AEPC. After review of the project construction and completion of testing and commissioning, AEPC will hand over the project to the applicant and recommend CREF for subsidy disbursement. CREF will disburse the subsidy after retaining 10% of the amount.

After 2 years of installation and subject to monitoring and evaluation by AEPC or sub-national governments, AEPC will recommend CREF to disburse the 10% retention amount.

7. STEP-BY-STEP PROCESS

Figure 3 shows the flowchart of the solar water pumping systems project implementation process. The process begins with a demand collection and follows through until the project is constructed and operational – ending with project handover. In Figure 3, in addition, to the right side of the flowchart, the documents related to each stage are defined.

Note: The documents for solar irrigation pumps (SIP) and solar drinking water (SDW) have been separated where necessary and listed side by side in the flowchart. Documents specific to SIP and SDW have been differentiated by letters 'A' and 'B' after the document number. For example, 6A is the DFS survey form for SIP and 6B is the DFS survey form for SDW.

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 SWP projects.

Legend

AEPC AEPC responsible for the accomplishment of the stage

User/Installer User/Installer responsible for the accomplishment of the stage

SIP means Solar Irrigation Pumps
SDW means Solar Drinking Water

Note:

Unless otherwise stated in brackets, SIP documents apply to both individual and community systems.

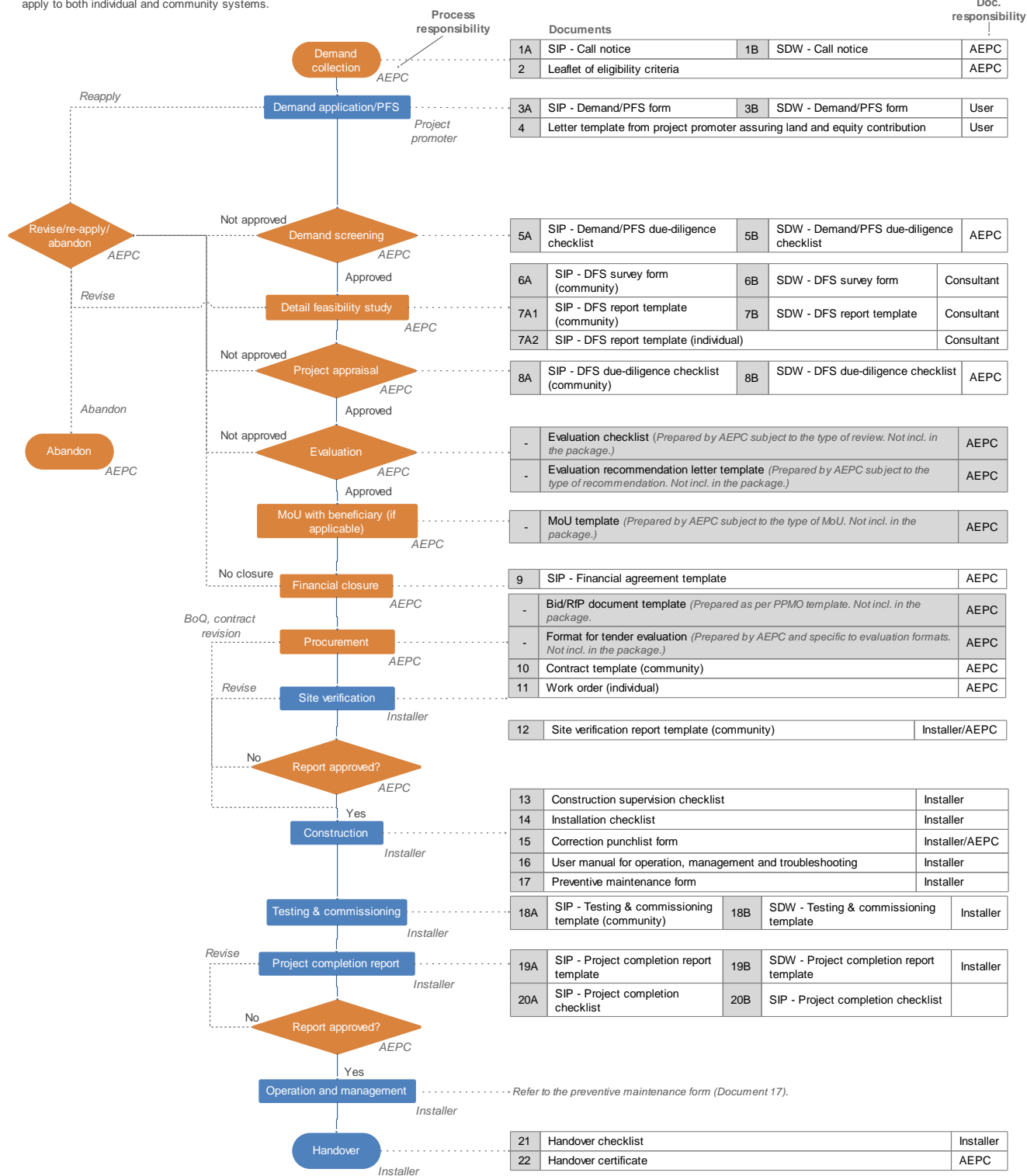


Figure 3: Process flowchart for government-supported solar water pumps

Table 2: Detailed process description

Process name	Doc. no.	Document	Description
Demand collection	1A	SIP – Call notice	Template for demand call by the government.
	1B	SDW – Call notice	
	2	Leaflet of eligibility criteria	Leaflet to be used by the government for simplified guidance to the applicants.
Demand application/PFS	3A	SIP - Demand/PFS form (separate for individual, community and private)	Demand form to be filled by the applicant.
	3B	SDW - Demand/PFS form (community)	
	4	Recommendation from project promoter assuring land and equity contribution	Letter confirming financial contribution and land availability for construction.
Demand screening	5A	SIP - Demand/PFS due-diligence checklist	Due diligence checklist used by AEPC to verify the quality and outcome of the Demand/PFS form.
	5B	SDW - Demand/PFS due-diligence checklist	
Detail feasibility study	6A	SIP - DFS survey form (community)	DFS survey format to be used by private companies (usually consulting firms) contracted by AEPC.
	6B	SDW - DFS survey form	
	7A1	SIP - DFS report template (community)	DFS report format to be used by private companies (usually consulting firms) as a report submission to AEPC.
	7A2	SIP – DFS report template (individual)	
	7B	SDW - DFS report template	
Project appraisal	8A	SIP - DFS due-diligence checklist (community)	Due diligence checklist used by AEPC to verify the quality and outcome of the DFS.
	8B	SDW - DFS due-diligence checklist	
Evaluation		Evaluation checklist	A checklist is to be used by the evaluation team for evaluating the project before recommendation. Hence, the document is not included in the package.

		Evaluation recommendation letter template	Prepared by AEPC subject to the type of review and recommendation. Hence, the document is not included in the package.
Agreement between AEPC/LG and others		Agreement template	A project MoU between AEPC and the local government confirming the implementation of the project. Hence, the document is not included in the package.
Financial closure	9	Financial agreement template	Prepared by AEPC subject to the type of agreement.
Procurement		Bid/RfP document template	Follow Nepal's procurement act. Hence, the document is not included in the package.
		Format for tender evaluation	A tender evaluation format is to be used by the local government or AEPC for evaluating the bid proposals. Hence, the document is not included in the package.
	10	Contract template	Prepared by AEPC as a contract award to the installer.
	11	Work order	A work order is issued by AEPC to the project promoter to install an individual solar water pumping system.
Site verification	12	Site verification survey report template	A site verification report template is to be used by the private company to verify the specifications provided in the bidding document against site conditions. The report will be submitted to AEPC to validate the design, and site conditions and bring attention to any deviations.
Construction	13	Construction supervision checklist	A construction supervision checklist is to be used by the private company or government for supervision during construction.
	14	Installation checklist	An installation checklist is to be used by the private company to ensure systematic and quality workmanship.
	15	Correction punch list form	A correction punch list is to be used by engineers of the private company, local government or AEPC to give a list of items to be rectified during installation supervision.
	16	User manual for operation and troubleshooting	The user manual for operation & troubleshooting is to be used by the private company and handed over to the operator to ensure adequate knowledge of the operator for system operation and basic troubleshooting.

	17	Preventive maintenance form	A preventive maintenance checklist is to be used by the installer (subject to agreement on after-sales service) or the local government (upon handover) to ensure that the system is operating smoothly.
Testing and commissioning	18A	SIP - Testing and commissioning template	A testing and commissioning template is to be used by the private company and AEPC for the installation.
	18B	SDW - Testing and commissioning template	
Project completion	19A	SIP - Project completion report template	A project completion report template is to be used by the private company for submission to the local government and AEPC.
	19B	SDW - Project completion report template	
	20A	SIP – Project completion checklist	A project completion checklist is to be used by the installer to ensure all obligations are completed before handing over the project to AEPC.
	20B	SDW – Project completion checklist	
Operation and management		Refer to the preventive maintenance form (Document 17).	
Handover	21	Handover checklist	A handover template is to be used by the installer to hand over the responsibility of system operation and maintenance upon fulfilling its contractual obligations.
	22	Handover certificate	A handover certificate is to be used by AEPC as a final document that certifies that the project has been handed over to the project promoter and that all obligations of AEPC are fulfilled.

8. ANNEXES

Annex 1A	SIP – Call notice
Annex 1B	SDW – Call notice
Annex 2	Leaflet of eligibility criteria • Template
Annex 3A	SIP - Demand/ Pre-feasibility study form (separate for individual, community and private)
Annex 3B	SDW - Demand/ Pre-feasibility study form (community)
Annex 4	Recommendation from project promoter assuring land and equity contribution
Annex 5A	SIP - Demand/ Pre-feasibility study due-diligence checklist
Annex 5B	SDW - Demand/ Pre-feasibility study due-diligence checklist
Annex 6A	SIP - Detailed feasibility study survey form (community)
Annex 6B	SDW - Detailed feasibility study survey form
Annex 7A1	SIP - Detailed feasibility study report template (community) • Template
Annex 7A2	SIP – Detailed feasibility study report template (individual)
Annex 7B	SDW - Detailed feasibility study due-diligence checklist (community) • Template
Annex 8A	SIP- Demand/PFS due-diligence checklist
Annex 8B	SDW - Detailed feasibility study due-diligence checklist
Annex 9	Financial agreement • Template
Annex 10	Contract • Template
Annex 11	Work order
Annex 12	Site verification survey report • Template
Annex 13	Construction supervision checklist
Annex 14	Installation checklist
Annex 15	Correction punch list form
Annex 16	User manual for operation and troubleshooting
Annex 17	Preventive maintenance form
Annex 18A	SIP - Testing and commissioning • Template
Annex 18B	SDW - Testing and commissioning • Template
Annex 19A	SIP - Project completion report • Template
Annex 19B	SDW - Project completion report • Template
Annex 20A	SIP – Project completion checklist
Annex 20B	SDW – Project completion checklist
Annex 21	Handover checklist
Annex 22	Handover certificate • Template

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