



Terms of Reference (TOR)

Training Content : Installation of Solar System and Quality Installation

Title	Solar Technical Knowledge - Training Content Development
Contract Supervision	Sr. Program Manager
Timeline	3 Months
Expected area of expertise	Content development, Content Writing, Module Development, Selar Technical Knowledge
Google form to apply	https://forms.gle/TcRrfpbKUqGJsQ29

About SELCO Foundation

SELCO Foundation, an NGO established in 2010 is working on building a holistic ecosystem for sustainable energy access. In this regard, SELCO Foundation engages in technical, financial and social innovation, enterprise development, skill building and financial inclusion. The organisation works on demonstrating and catalysing the role of renewable energy across verticals of well- being, health, education, livelihoods and the built environment.

Context

With the current climate and energy crisis, the role of a clean, decentralised and sustainable energy source has become crucial. Not only does it provide accessible and affordable energy to off-grid areas, it also ensures a broad space for technological solutions and innovations to counter the current crisis and to work towards enabling the sustainable development goals. Yet there is a huge gap in the sector due to a lack of entrepreneurs/enterprises/organisations across the world, to build and promote a holistic and sustainable energy ecosystem. Selco Foundation, therefore, has been developing programmes to support, train and guide clean energy entrepreneurs and enterprises.

To help build the capacity and skills of entrepreneurs, in-depth training on business knowledge of planning and developing an enterprise is necessary. However there is a dearth of customised and easily understandable learning materials to deliver quality training for the Clean Energy Enterprises. With SELCO's open source policy and aim to develop solutions for the sector, this project focuses on developing modules to impart business aspects in a format that becomes usable, understandable and with little effort can be contextualised by anyone across the globe.

Objective

The objective is to develop training modules for the training of technical persons and clean energy enterprises. The aim of the training is to achieve the below mentioned goals.

- To develop the needed skill sets for the technicians for solar system installation
- To provide hands-on support and practical training around solar system installation



Scope of the Work

The scope of the work is to create customised and hands-on experience training content for technical persons. **The content developer has to take into consideration solar system installation in all kinds of typology like disaster prone areas (North East) , Mud roof , concrete roof , installation of battery in a limited space etc**

Target Audience	Topic	Module Details
Entry level technicians Experienced Technicians ITI Students Electrician	Background of Solar Technology	What is Solar Energy ? Why Solar Energy ? (Basic about Solar Energy and Usage)
	Solar System	Solar PV Photovoltaic System Solar Panel (Module): Type of PV Modules ; Standard Certification of PV Module , MNRE empanelled vendor, Reading name plate of Solar PV module Charge Regulator / Charge Controller : Why use charge controller , Dangers of bypassing a charge controller Solar Batteries : Type of batteries , Battery specifications , MNRE empanelled vendor Solar Inverter and Power Conditioning Unit (PCU): Difference between Solar inverter and PWC , types , specification, MNRE empanelled vendor
	Tools used for Installations	Details about the tools to be used for the installations
	Safety Precautions during installation	Potential risks from solar PV systems, Safety equipments/ measures are to be used to mitigate the risk
	Checklist of the materials to be carried at the installation sites	Standard checklists - to be verified as per the solar system design and Bills of Materials
	General Consumables for the installations	General consumables are to be carried for any type of installation List of the consumables like .Lugs, PVC pipes & Elbow, Cable Tie, MC4 connector, Metal Clamps , Nails & Screws etc
	Pre Installation and Installation	The Installations are to be considered for different typology and different category of target audience like Pre Installation Preparation - <ul style="list-style-type: none"> - Safety gears - Installation Tools - Availability of all the materials - as per BOM - Planning technicians - how many are required to complete in a certain time frame - Unpacking of the Materials - Do's and Don't - Display Materials



		<p>During Installation</p> <p>Installation - Balance of the System</p> <ul style="list-style-type: none">- Types of Panel and process of Installation in different typology - direction , wiring , Parallel or series etc- Types of MMS and process of Installation in different typology - types of MMS, how to instal in disaster prone areas etc <p>Common Error During Installation is to be captured :</p> <ul style="list-style-type: none">- Drilling of roof should not be done in old buildings / soft roofs instead use ballast blocks- Low elevation of MMS in high wind zone and disaster prone areas- Earthing of structure should not be welded , it should be nut - bolted etc . <p>Installation of Battery</p> <ul style="list-style-type: none">- Types of Battery , Advantages and Disadvantages- Space to be finalised for the battery installation - ventilated space , how to do the installation in a limited space- Process of installation <p>Common Error are to be captured :</p> <ul style="list-style-type: none">- The battery terminal connection should not be loose- Earthing of the battery rack should be done- Cables shouldn't pass over the batteries etc <p>Installation of Inverter / PCU</p> <ul style="list-style-type: none">- Difference between inverter and PCU and usage- Where inverter and PCU are to be installed- Proper selection of the place should be done such that the distance between the array and the PCU should be minimum- The process of Installation <p>Common Error are to be captured :</p> <ul style="list-style-type: none">- no flammable/inflammable material in the PCU room- no damage to the cables entering the PCU etc. <p>Cable Routing</p> <ul style="list-style-type: none">- Step by step process of cable routing <p>Common Error are to be captured :</p> <ul style="list-style-type: none">- Proper numbering of cables are to be done. <p>Earthing</p> <ul style="list-style-type: none">- Types of Earthing- Entire process are to be captured like process of Earthing - chemical earthing, measuring the earthing resistance ,
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		<p>construction of earthing pit, connection of earthing rod, etc</p> <p>Common error are to be captured</p> <p>Installation Lighting Arrestor</p> <ul style="list-style-type: none"> - Types of lighting arrestor and advantages and disadvantages - The LA should be given an additional elevation to increase the protection zone. The LA and the elevation pole must be given insulation - Multiple LA should be used depending upon the larger area of panels installed. - Cone-of-protection method should be used for simple roof structures. Etc - Surge protection devices installation etc <p>The entire process are to be captured</p> <p>Common Error: There should not be loose earthing connection to LA.</p> <p>Load Wiring</p> <ul style="list-style-type: none"> - Triple Phase - Separate load wiring - Separate load wiring is to be provided for the solar load, i.e the “critical loads” which includes the medical equipment or luminaries such as LED bulb and tube lights as well as ceiling/pedestal fans. - Depending upon the type of sites , the load details should be cross verified and the connection to the same should be made. <p>Common error are to be captured</p> <p>Installations are to be captured for different category of system -</p> <ul style="list-style-type: none"> - <i>Inverter Based system</i> - <i>On grid system</i> - <i>Offgrid system</i> - <i>Solar thermal system like Solar Water Heater</i>
	<p>Installation Practices</p>	<p>Do’s and Don’ts for all the components Bad Practices and Good Practices for all the components</p>
	<p>Commissioning and Inspection checklist</p>	<p>Cross checking of wiring flow and working of loads Electrical parameter check: Panels , ,Wires ,PCU/ Inverter, Batteries</p>
	<p>Importance of Documents and Significance</p> <p>Documentation before Installation</p> <p>Documentation after Installation</p>	<p>System Design , BOM , Layout of the sites</p> <p>Installation completion certificate</p> <p>Other documents like warranty card , invoice , order copy etc.</p>



Note :

1. The content should be with perspective of SELCO Learnings
2. Clean Energy Enterprises means solar component aggregator . They aggregate solar components , do installation and provide service & maintenance. They are not manufacturers
3. Numbers and different category of stakeholders are to be consulted for the content development
4. Consultant / Agency are to be travelled to Karnataka and take our input for the content development. The consultant is required to do the field visit in Karnataka for the consultation
5. The consultant is required to identify the stakeholders (working solar decentralised sectors) for the consultation
6. SELCO Foundation team will share the previous and basic content developed in house for reference
7. **STEP BY STEP PROCESSES ARE TO BE MAPPED OUT FOR THE INSTALLATION**
8. Existing Content [Existing Installation Content](#)

The work will involve developing training content for clean energy enterprises including interactions and workshops with stakeholders, doing secondary research on the required aspects of managing an enterprise and creating toolkits, modules, decks, (by means of documents, decks, guidelines, self explanatory checklists and other easy to use formats) which can be used in totality and in modular formats to help build capacities, co-develop programs, or design solutions and tools for the Clean Energy Enterprises. Through this exercise, the aim is to give the learner a complete understanding of business requirements from its conceptualisation to its expansion. The document should also be able to guide other stakeholders to be able to replicate these programs in their own contexts and geographies.

Training plan and materials required for all the modules

- **Training materials:**
 - a. Training documents: Facilitator's guide and Learner's manual
 - b. Deck for training with activity and experiential based learning and mapped videos
 - c. Handouts : Checklist, Templates, Guidelines etc.
- **Training methodology :** Classroom sessions, exposure visit, shadowing, VR videos etc.

Training Target Audience : Ecosystem Stakeholders

- Technicians , ITI Students , B Tech Students
- Entrepreneurs - Clean energy Enterprise and their employees (India + Global Enterprises doing Solar Businesses)
- Trainers who will train these enterprises

Methodology and approach for content development

The methodology includes, but is not limited to review and usage of existing content, stakeholder consultations, field visits, etc..

1. **Secondary research:** in-depth understanding and review of the existing program documents, reports, program-specific information, any other relevant training materials and ongoing training.
2. **Stakeholder consultations:** Meeting and interacting with stakeholders from across India (including the ones from SELCO's network) to verify the information and get feedback on the process, documentation and modules.
3. **Field visits:** This includes sample sites visits to understand about the systems and needs of the target audience.
4. **Focus regions:** This project is focused on creating modules which can be easily understandable and usable by anyone in the world. The document can cover examples from SELCO India.
5. **Review and feedback :** Two rounds of review and feedback.
6. **Piloting of training modules:** On field testing of the training modules and training of trainers on the training modules.

Note: The agency / consultant is required to identify the CEEs and other stakeholders for the consultation before start developing the content

Deliverables



Deliverable	Required Number
Preparation Plan	1
Consultation of stakeholders - Report	1
Curriculum	1
Facilitator's Guide	1
Learner's Manual	1
Training Decks (can be topic wise)	
Mapping of videos required for the training purposes	

Note: We have few old contents available for your reference.

Expertise Required

- Agency/ Individual with an experience in content development and assignment writing.
- Knowledge and familiarity with business aspects for enterprises/start-ups is desirable
- Experience on compilation of entrepreneurship and business related information is preferable
- Excellent written and verbal communication skills.

Selection Criteria

The technical proposal will be evaluated based on the following general areas:

1. Agency/ Consultant experience in the field of assignment
2. Understanding of the aims and objectives
3. The qualifications and relevant experience of the personnel.
4. The financial proposal will be evaluated on the basis of expertise, cost, lead-time and proposed payment terms.

The above points are intended to help in making the learning more holistic which helps in creating a set of modules, decks, etc. Hence, understanding the process of creating these programs, bottlenecks around the same, and ways on how to operationalise it will be critical

Interested consultants / organisations, with relevant experience (please include samples and/or references of the previous similar work as proof of experience) and based out of India are requested to reach out with a detailed proposal giving a brief on the methodology and the process they will uptake for this project, including budgets (with break-ups and explanation), timelines and milestones and send the same to procurement@selcofoundation.org marking sweta@selcofoundation.org in cc with a subject line: "Proposal for Developing Vendor and Supply Chain Management" on or before 20th Nov'23 (rolling basis selection)

Interested consultants/ organizations, with relevant experience (please include samples and/or references of the previous similar work as proof of experience) and based out of India are requested to reach out with a detailed proposal giving a brief on the methodology and the process they will uptake for this project, including budgets (with break-ups and explanation), timelines and milestones and submit the same to google form <https://forms.gle/TcRrfjpbKUqGJsQ29> on before 25th November 2023.

Any further queries please write to procurement@selcofoundation.org with a subject line: "Training Content : Installation of Solar System and Quality Installation"



Annexure 1
Standard Operating Procedure of Content Development

Steps	Details
Step 1	Setting the goals , objectives and expected output as per the target audience
Step 2	Secondary research to understand the need of the target audience and standardisation of the contents as per global standard
Step 3	Review of the existing SELCO Foundation's content
Step 4	Consultation with different level of stakeholders - <ul style="list-style-type: none">- Practitioners- Senior , Middle and Junior level (India + Globally)- Industry Experts (India + Globally)
	Ist Draft
Step 5	Validation of the content two level at least post content development <ul style="list-style-type: none">- Practitioners- Senior , Middle and Junior level (India + Globally)- Industry Experts (India + Globally) <p><i>Note : Practitioners and Industry experts will be identified by both the partners SELCO Foundation and onboarded Agency / Consultant . Both the partners are supposed to take effort in identification</i></p>