Training module for the repair and maintenance of electric pressure cookers and induction stoves.

Guide for Trainers

Module Contents

1. Introduction to the module

This training module has been developed by People Energy and Environment Development Association (PEEDA) to support the Technical Education and Vocational Training (TEVT) sector in Nepal provide training on the repair and maintenance of electric cooking (eCooking) appliances. eCooking repair and maintenance services are urgently needed in Nepal to increase consumer confidence and the long-term use of eCooking, and support the sustainability of the Government of Nepal's policy to rapidly accelerate eCooking in Nepal.

The module equips TVET institutions in Nepal with the comprehensive knowledge and skills necessary for integrating eCooking appliance repair and maintenance modules into their existing training courses (e.g. broader home appliance repair & maintenance training courses). By integrating this module, TEVT institutions can effectively contribute to the broader objectives of the Nepali Government, the Alternative Energy Promotion Centre (AEPC), and other organizations involved in mass distribution projects of eCooking appliances through the training of technicians who operate in the areas these projects target. This integration will not only enhance the skill sets of technicians but also bolster the sustainability initiatives aimed at promoting eco-friendly cooking practices across Nepal.

Through collaboration with governmental and non-governmental entities, this initiative seeks to maximize the impact of eCooking appliance distribution projects, ensuring their long-term sustainability and scalability. By leveraging the expertise of stakeholders and embracing a holistic approach to training, the TEVT sector can play a pivotal role in driving the adoption of eCooking technologies and fostering a greener, more sustainable future for Nepal.

This training module and the larger repair study was funded and received technical support from the UKAid Modern Energy Cooking Services (MECS) programme and created in coordination with Alternative Energy promotion Centre (AEPC).

2. Module Development and Overview

While CTEVT and CTEVT authorised training programs currently cover electrical appliances, they currently do not cover modern efficient electric cookstoves such as induction stoves and electric pressure cookers (EPC), which are becoming increasingly common in Nepal and are central to Nepal's efforts to transition away from polluting fuels. This training module was prepared by People Energy and Environment Development Association (PEEDA) to address this gap and specifically focuses on induction stoves and EPCs.

The module was developed by drawing on the findings of a broader MECS funded PEEDA study into repair of eCooking appliances. The study surveyed institutions, service centres, trainers, technicians, suppliers and households to assess the most common faults for induction stoves and EPCs. Existing CTEVT modules for electrical appliances were also reviewed in order to best understand how this module could most effectively be integrated into training courses.

Two versions of the training module were developed to cater for different types of trainee profile.

- Version 1 – a shorter 2-day programme for more experienced technicians
- Version 2 – a longer 5-day programme for less experienced technicians

Information on understanding trainee profiles and their training requirements can be found in section 3. Details of training module version 1 and 2 can be found in sections 4 and 5, while section 6 provides a list of useful contacts and further sources of information.

3. Understanding Trainee profiles and their requirements

This module can be used with trainees with a range of different backgrounds and experience but requires different approaches to the way the module is used. The section below outlines three common trainee profile types, what is required of each profile before taking the module, and advice on how to approach using the module with each profile type.

1) **Untrained potential technician:**
Profile
    a. These individuals lack formal education or training in electrical and electronics.
    b. They may possess a basic interest or curiosity in the field but lack specific skills.

c. Without formal training, they might have a limited understanding of safety protocols, circuitry, and electronic components.

Requirements before taking the module:

- Before taking the module, individuals in this profile are required to pass CTEVT Level 1 Basic Electrical and Electronics Training (or equivalent course provided by a CTEVT authorized institute). These courses provide foundational knowledge in electrical and electronics and should cover: basic circuit theory, electronic components, and introductory troubleshooting.

Approach for using the training module:

- The 5-day version of the training program is recommended for these technicians.

2) **Technician with basic training (CTEVT Level 1) but limited experience in electronics repair:**
Profile

a. These individuals have passed the CTEVT Level 1 Basic Electrical and Electronics Training (or equivalent course provided by a CTEVT authorized institute).
b. Despite having theoretical knowledge, this technician may not have significant hands-on experience.

Requirements before taking the module:

- None

Approach for using the training module:

- The 5-day version of the training program is recommended for these technicians.
- These technicians often lack hands-on experience and might need additional guidance when applying their knowledge to practical scenarios.

3) **Technician with basic training (CTEVT level 1) and experience in electronics repair:**
Profile:

a. These individuals have passed the CTEVT Level 1 Basic Electrical and Electronics Training (or equivalent course provided by a CTEVT authorized institute)
b. They have a solid theoretical understanding of electrical and electronics principles.

c. They have experience in the practical application of their skills in electronic repair and maintenance and are likely familiar with diagnosing faults, soldering, and replacing components in electronic devices.

d. This technician is more self-reliant and capable of handling basic repairs independently.

Requirements before taking the module:

- Trainees work for organizations already embedded within the local repair supply chain.

Approach for using the training module:

- The 2-day version of the training program is recommended for these technicians.
- Training will focus on advanced troubleshooting techniques for induction stoves and electric pressure cookers.

4. Training Module

The module content was first put into the format used and requested by CTEVT which details the course content covered but not the timetable (see section 4.1). This content was then transferred into two timetables: one for the 2 day program and one for the 5 day program, which are shown in sections 4.2 and 4.3.

4.1 Training module (CTEVT format)

Training Module 1

Repair and Maintenance of Induction Cookstove
Training Module
Task Analysis

Total time: 6 hrs
Theory time: 1 hr
Practical time: 5 hrs

S.N.	Steps	Terminal Performance Objective	Related technical Knowledge
1.	Take Instruction	Given: Workshop, damaged induction cooker, circuit diagram for various induction cooker	• Working principle of various induction cooker provide • Specification of various components provided. • Process of dismantling and re-assembly
2.	Collect required tools, equipment and wear safety gears		
3.	Testing of electrical cord of Induction cookstove		
4.	Testing of Input terminal of Induction cooker		
5.	Visual Inspection of components damages		
6.	▪ Troubleshooting start-up problems: inspection of **IGBT,** fuse, bridge diodes, capacitors, and resistors – replacement of faulty parts ▪ Troubleshooting of buttons issues and their replacement ▪ Inspection of the cooling system and fans – replacing fans, fixing blocked vents ▪ Inspection of heat sensors and temperature control – replacement of faulty sensors ▪ Troubleshooting of other control panel issues and their replacement ▪ Addressing broken cooktops ▪ Fixing display not working issues ▪ Checking for and addressing loose connections, damaged wiring, short-circuiting ▪ Checking all error codes	Task: Repair of Induction cooker	
8.	Reassemble the device		
9..	Provide the supply and check if the device is working properly	Standard: Proper functioning of Provided Induction cooker	
10.	Clean the workshop working area		
11	Put the tools and components on its original position		

Repair and Maintenance of Electric Pressure Cooker Training Module

Total time: 6 hrs
Theory time: 1 hrs
Practical time: 5 hrs

Task Analysis

S.N.	Steps	Terminal Performance Objective	Related technical Knowledge
1.	Take Instruction	Given: Workshop, damaged EPCs, circuit diagram for various EPCs	• Working principle of various EPCs provide • Specification of various components provided. • Process of dismantling and re-assembly
2.	Collect required tools and equipment's		
3.	Testing of electrical cord of EPC		
4.	Testing of Input terminal of Induction cooker		
5.	Visual Inspection of components damages		
6.	▪ Addressing EPC not turning on problem: Testing of fuse, diodes, Zener diodes, capacitors and resistors ▪ Addressing inner pot not heating check for loose connections and damaged wiring, inspect heating element and temperature sensor – replace faulty components. ▪ Fixing display not working problem: Check connections and display settings – replace faulty display. ▪ Mechanical issues like lid jamming, broken hinges, pressure valve etc. ▪ Checking all error codes	Task: Repair of EPC	
7.	Reassemble the device		
8.	Provide the supply and check if the device is working properly	Standard: Proper functioning of Provided EPC	
9.	Clean the workshop working area		
10.	Put the tools and components on its original position		

Tools, equipment's, and materials:

Soldering Iron and wire, different sizes of screwdriver, Extension Cord, Multimeter etc.

Safety/Precautions:

1. Provide electrical supply to Induction Cooker/EPC only after checking the cord visually and with multimeter.
2. Makes sure the terminals and screwdrivers and tightened properly.

Equipment provided by training facility: damaged induction cooker and electric pressure cooker, circuit diagram for devices, all required tools and safety equipment.

4.2 Training Module Version 1 (2-day program)

Training Module Version 1 is a 2-day training program (12 hours total) for Profile 3 trainees, which includes some theory but mainly focuses more on practical advanced troubleshooting techniques for induction stoves and electric pressure cookers. The course is two days as it is assumed that trainees already work in the repair supply chain and may have limited scope to take time off from their regular jobs.

Total time: 12 hrs (Theory time: 2 hrs Practical time: 10 hrs)

Day 1. Advanced Troubleshooting for Induction Stoves and EPCs (all sessions 1.5 hours unless indicated)		**Time (hr)**
Morning Session 1	Morning Session (Induction Stove): Review of Components and Operation: ▪ Comprehensive overview of key components such as the induction coil, control panel, fan, temperature sensors, and their roles in the functioning of the stove. Troubleshooting Techniques: ▪ An in-depth discussion on diagnosing complex issues, including power fluctuations, coil malfunctions, and control panel errors. ▪ Analysis of common error codes and their corresponding troubleshooting steps.	1.5
Session 2	Hands-on Practice: ▪ Participants engage in practical exercises utilizing diagnostic tools to identify and diagnose problems accurately.	1.5
Break/Lunch		
Afternoon Session 3	Afternoon Session (Electric Pressure Cooker): Review of Components and Functionality: ▪ Brief review of components, including the pressure cooker pot, heating element, control panel, pressure release valve, and safety mechanisms. Troubleshooting techniques: ▪ Detailed exploration of issues like pressure regulation failures, temperature sensor malfunctions, and control panel errors. ▪ Strategies for diagnosing and resolving complex problems efficiently.	1
Session 4	Hand on practice: ▪ Participants work through repair scenarios to apply the troubleshooting techniques they learned, focusing on identifying root causes and implementing effective solutions.	2

Day 2. Repair, disassembly, and reassembly for Induction Stoves and EPCs (all sessions 1.5 hours unless indicated)		**Time (hr)**
Morning Session 1	Morning Session (Induction Stove): Repair Techniques: ▪ Step-by-step guidance on replacing faulty components such as induction coils, control boards, and temperature sensors. ▪ Demonstration of specialized repair tools and equipment required for intricate repairs.	1.5
Session 2	Disassembly and Reassembly Best Practices: ▪ Instruction on proper disassembly techniques to avoid damage and ensure safe removal of components. ▪ Tips for reassembly to ensure correct alignment and functionality. Sourcing Replacement Parts: ▪ Guidance on sourcing genuine replacement parts and navigating the process of ordering from manufacturers or authorized distributors.	1.5
Break/Lunch		
Afternoon Session 3	Afternoon Session (Electric Pressure Cooker): Hands-on practice: ▪ Practical workshop where participants perform repairs on electric pressure cookers, focusing on tasks such as replacing heating elements, fixing pressure release valves, and addressing sealing ring issues. ▪ Individualized guidance and support from instructors as participants work through repair tasks.	1.5
Session 4	Disassembly and Reassembly Best Practices: ▪ Instruction on proper disassembly techniques to avoid damage and ensure safe removal of components. ▪ Tips for reassembly to ensure correct alignment and functionality. Preventive Maintenance Procedures: ▪ Demonstration of preventive maintenance tasks to prolong the lifespan of electric pressure cookers, including cleaning, lubrication, and inspection of critical components.	1.5

4.3 Training Module Version 2 (5-day program)

Training Module Version 2 is a 5-day training program (30 hours total) for Profile 1 & 2 trainees. As this module is designed for individuals with less experience in electronics repair, the content of the module is more detailed to enable the participants to gain more knowledge and skills and more hand-on experience with repairing eCooking appliances. The module also includes more theory than Module 1. Details of the Training module are as below:

Total time: 30 hrs (Theory time: 6 hrs Practical time: 24 hrs)

Day 1. Introduction to Induction Stoves & Electric Pressure Cookers (EPCs)		**Time (hr)**
Morning Session 1	Overview of Induction Stoves and Electric Pressure Cookers: ▪ Discuss the basic principles behind each appliance, including how induction stoves use electromagnetic induction to generate heat and how electric pressure cookers use pressure and heat to cook food. ▪ Overview of the most common tools for the repair and maintenance work	1.5
Session 2	Safety Precautions and Hazards: ▪ Emphasize safety measures such as, avoiding water contact, and handling high temperatures.	1.5
Break/Lunch		
Afternoon Session 3	Comparison of Components: ▪ Identify and explain the key components of both appliances, such as heating elements, control panels, pressure release valves, and safety mechanisms, together with resistors, capacitors, relays, IGBT, transistors, switches, diodes etc.	3

Day 2. Troubleshooting Basics and Disassembly and Assembly of Induction stoves		**Time (hr)**
Morning Session 1	Troubleshooting Basics ▪ Common Issues and Causes: Discuss common problems like no power, uneven heating, or error codes, and their potential causes such as faulty components or electrical issues. Diagnostic Tools and Techniques: ▪ Introduce multimeters, and other diagnostic tools.	1.5
Session 2	Hands-on Practice: ▪ Provide scenarios where participants can apply troubleshooting techniques to diagnose and solve simulated issues.	1.5
Break/Lunch		
Afternoon Session 3	Step-by-Step Disassembly Guide: ▪ Provide a detailed walkthrough of how to disassemble an induction stove safely, Identification of Key Components: ▪ Help participants understand the function of each component and how they interact within the stove. Reassembly and Testing: ▪ Guide participants through the reassembly process, ensuring they reconnect components correctly. Test the stove to ensure it functions properly.	2
Session 4	Proper Handling and Storage: ▪ Stress the importance of handling components with care to avoid damage and the need for proper storage to prevent contamination or loss. Cleaning Techniques:	1

	▪ Demonstrate proper cleaning methods for different parts of the stove, including the cooktop, fan, and ventilation system, using appropriate tools.	

Day 3. Troubleshooting Basics and Disassembly and Assembly of an EPC		**Time (hr)**
Morning Session 1	Troubleshooting Basics ▪ Common Issues and Causes: Discuss common problems like no power, uneven heating, or error codes, and their potential causes such as faulty components or electrical issues. Diagnostic Tools and Techniques: Introduce multimeters, and other diagnostic tools.	1.5
Session 2	Hands-on Practice: Provide scenarios where participants can apply troubleshooting techniques to diagnose and solve simulated issues.	1.5
Break/Lunch		
Afternoon Session 3	Step-by-Step Disassembly Guide: ▪ Provide a detailed walkthrough of how to disassemble an EPC safely, Identification of Key Components: ▪ Help participants understand the function of each component and how they interact within the EPC. Reassembly and Testing: Guide participants through the reassembly process, ensuring they reconnect components correctly. Test the EPC to ensure it functions properly.	2
Session 4	Proper Handling and Storage: ▪ Stress the importance of handling components with care to avoid damage and the need for proper storage to prevent contamination or loss. Cleaning Techniques: Demonstrate proper cleaning methods for different parts of the stove, including the ventilation system, using appropriate tools.	1

Day 4. Advanced Troubleshooting for Induction Stoves		**Time (hr)**
Morning Session 1	Advanced Troubleshooting and Repair for Induction stoves ▪ Complex Issues and Solutions: Explore problems like circuit board failures, component malfunctions, or system errors, and discuss troubleshooting strategies to address them.	1.5
Session 2	Repair Techniques: ▪ Teach to repair or replace damaged components, including soldering techniques, component testing, and sourcing replacement parts.	1.5
Break/Lunch		
Afternoon Session 3	Case Studies and Practical Application: ▪ Present real-world scenarios or case studies for participants to analyze and solve, applying the knowledge and skills they've learned throughout the training.	3

	▪ Asking the trainee to bring the faulty Induction Stove to repair under the supervision of the trainer	

Day 5. Advanced Troubleshooting for EPCs		**Time (hr)**
Morning Session 1	Advanced Troubleshooting and Repair for Electric Pressure cooker (EPC) ▪ Complex Issues and Solutions: Explore problems like circuit board failures, component malfunctions, or system errors, and discuss troubleshooting strategies to address them.	1.5
Session 2	Repair Techniques: ▪ Teach to repair or replace damaged components, including soldering techniques, component testing, and sourcing replacement parts.	1.5
Break/Lunch		
Afternoon Session 3	Case Studies and Practical Application: ▪ Present real-world scenarios or case studies for participants to analyze and solve, applying the knowledge and skills they've learned throughout the training. ▪ Asking the trainee to bring the faulty Electric Pressure Cooker to repair under the supervision of the trainer	3

5. Further information and Contacts

The following provides a list of information sources and organisations for further information on eCooking repair and maintenance.

Organisation / information source	**Useful for…**	**How to contact**
PEEDA repair manual		https://peeda.net/
Doko Recyclers		https://dokorecyclers.com/