KATHMANDU UNIVERSITY
SCHOOL OF ENGINEERING
DEPARTMENT OF MECHANICAL ENGINEERING

PROPOSAL ON:
COMMUNITY BASED PROJECT IN SINGATI AND ITS PERIPHERAL

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# Table of Contents

BACKGROUND ................................................................. 2

INTRODUCTION ............................................................... 2

STATEMENT OF THE PROBLEM ........................................ 2

PROBLEM STATUS .......................................................... 2

OBJECTIVES ........................................................................ 3

RATIONALE ........................................................................ 3

RESEARCH QUESTIONS ..................................................... 4

LITERATURE REVIEW ......................................................... 5

TECHNICAL DESCRIPTION ................................................. 6

BENEFITS OF OUR DESIGN ................................................. 7

METHODOLOGY ................................................................. 7

GHANTT CHART .................................................................. 8

COST ESTIMATION: ........................................................... 9

WORKS CITED .................................................................... 10
BACKGROUND
Majority of people (88%) live in the rural areas in Nepal. Of the total energy requirements of the country, rural areas account for 80%. Accessibility of the electricity, LPG gas and kerosene oil in the rural areas is very limited. The vast majority of the people have to depend on fuel wood for cooking, heating, and lighting as their basic energy consumption. This is causing the depletion of forest drastically in rate of 100,000 ha/year and deteriorating the environment. It is also deteriorating the living standard and health of living organisms.

INTRODUCTION
An improved cooking stove is a stove that needs far less biomass to cook the same amount of food than a traditional one and consequently produces also far less smoke than a traditional stove. Improving the combustion efficiency is necessary to reduce smoke and harmful emissions that damage health. The smoke is a product of incomplete combustion in the stove. Improved cook stoves reduce considerably the smoke, either by having a far better combustion or by have an excess of air or with a combination of both.

STATEMENT OF THE PROBLEM
These are some prevailing problems encountered by Nepalese which encouraged designers to think of some alternatives ways for cooking.

- depleting forest (1,00,000 ha/year)
- deteriorating ecology and environment (floods, landslides etc)
- loss of people & prosperity
- growing desertification process
- increasing load for fuel collection
- increasing health hazard due to smoke

PROBLEM STATUS
The problem in Jhyaku was the lack of electricity in local households. Due to the lack of electricity the people living there are unable to enjoy their life to uplift their quality of life of living. Many of the people still rely on conventional stoves for cooking their daily meals which further deteriorates their life standard. We also interviewed several locals on our way to which revealed that distribution of ICS to the locals in the past has uplifted their standard of living to some extent. So they are very much interested and eager in getting response from us. We
personally interviewed four households in which all of them showed positive response towards our project. One of the locals Dil Bahadur Gurung said and we quote “मैऱे पहिला नि यो सुधारियको चुऱो जडान गरेको थिए र जैले देखि यो चुऱो प्रयोग धरमा गरियो मेरो घरका मान्छेहरु कम बिरामि पने थाले “. From his response we felt the obligation to install at least one ICS in that community.

**OBJECTIVES**

**Overall Objective**

To popularize and promote the use of improved cooking stoves (ICS’s) to raise the living standard of the rural people, to protect the environment and to develop commercially viable alternative energy industries in the country.

**Specific Objectives**

- To design an scientific measure for an improved cooking stoves that uses scientific and verified measures which enables the user of ICS a safer and faster cooking mechanism.
- To understand the problems caused by conventional and inefficient method of cooking stoves and propose a efficient solution for those stoves.
- To address the harmful emissions and propose a solution for their safe disposal.
- Raising awareness among the community people towards adopting the environment friendly technology.

**RATIONALE**

This project is suitable for us to conduct in our second year project as our university along with the government of Nepal is carrying out a community education pilot project (CEPP). CEPP’s main goal is to allow us to visit the project site by ourselves and experience the lifestyle which will surely be very much beneficial for the completion project. Also we have some knowledge in workshop practices from our first year projects, plus we are currently studying “manufacturing process” which allows us to gain information on various types of material manufacturing methods which will surely be a lot of help during our project.

It is quite practical for us to complete our project in time as we will have all the knowledge we need and all the members are hardworking and always eager to be involved in projects. Also this cepp project is aimed so as to improve the living standard of the people living in that locality and hopefully the whole nation if found feasible.
Therefore, academically, financially, scope wise, time wise and resource wise, this project is a practical project.

RESEARCH QUESTIONS

- How is ICS different from traditional cooking stoves?
- Has ICS fulfill its promises?
- What changes have you experienced since the installation of ICS?
- Are you satisfied with new ICS technology?
- Would you recommend ICS to any other household? Explain your reason.

Scope of work

The scope of the work of ICS can be explained by the benefits associated with improved cook stoves that fall in two categories:

Internal benefits include:

- Reduced concentrations of smoke and consequently indoor air pollution;
- Money and time saved in acquiring fuel; and
- Reduced biomass uses.

External benefits include:

- Less pressure on forest and energy resources (deforestation);
- Reduced greenhouse gases; and
- Skill development and job creation in the community producing and installing the stoves.
LITERATURE REVIEW

Improved Cooking Stove (ICS) is being designed and fabricated by our seniors of mechanical department as a part of requirement for fulfillment of their course credit in their Third Year.

The development of mud brick stove by Research Center for Applied Science and Technology, Nepal (RECAST) re-launched the stove program and later built it completely from cheap readily available local materials. ICS became important and integral component of development initiatives and was supported by quite a number of programs, donor agencies and promoting/disseminating organizations. The collective efforts of such organizations together promoted about 40,000 improved stoves of various types (mud, metallic) in different districts of Nepal.

In 1995, ICS network supported by Asia Regional Cook Stove Program (ARECOP) was established which is aimed at bringing together various organizations working in ICS promotion and dissemination and expanding the utilization of ICS. His Majesty's government of Nepal provided policy guidelines to encourage development and application of energy saving devices as well as promotion and dissemination of alternate energy technologies from 9th plan (1997–2002). HMG set a target of promoting 250,000 ICS during the plan period through the collective efforts of government, non-government organizations and the private sectors. Nevertheless very little of the target was achieved. Within the present 10th five-year plan (2003-2007) HMG had further emphasized ICS dissemination with target to install 250,000 ICS as well as the development of research and development activities.
TECHNICAL DESCRIPTION
This project will mainly be focused on designing an improved cooking stoves based on the present problems encountered by the local people on the targeted site. We have been working on the design especially on the complete combustion of the stove to minimize the fuel consumption. The series of procedures that are to be performed are:

a) **Design**
   This is the first step where we design a basic layout of improved cooking stove.

![Basic design](image)

**Fig: Basic design**

b) **Initial Fabrication**
   This includes fabricating the modeled design. At first the stove with minimum height limit of stove is fabricated so that we can vary the height of stove by adding small cylindrical section as an additional height.

c) **First Performance Test**
   Using series water boiling test for various heights, we calculate the efficiencies of stove. For this we keep the grit height constant.

d) **First Interpolation**
   This is the theoretical part for our project where we use the data collected from the practical testing to generate a polynomial equation which relate the height of stove to its efficiency. Through the equation generated we can easily find out the most efficient height for the stove.

e) **Second fabrication:**
   After finding out the appropriate height for the stove, the second stove with designated height is fabricated. Here we make number small slabs that could be fitted beneath the grit which eventually will act as different grit heights.
f) Second performance test
   For this we calculate the efficiencies of stove for different grit heights.

g) Second interpolation
   Once again techniques of interpolation are used to find out the most appropriate grit height for the stove.

h) Final fabrication
   Then, we will fabricate the final design based on the results obtained from interpolations.

BENEFITS OF OUR DESIGN
Since one of the main problems encountered by the local people of site is the shortage of fuel, it would really be helpful to them to minimize the fuel consumption. As our design has the greatest efficiency, it definitely consumes less fuel and will prove to be very helpful to their community. Moreover there are not any improved cooking stoves on that area; it’s high time for us to introduce them with improved cooking stoves.

METHODOLOGY
The whole of our project is basically divided into the following parts:
   ➢ CEPP project selection
   ➢ Site visit
   ➢ Questionnaire distribution and interviewing with the local
   ➢ Data collection statistical evaluation
   ➢ Problem encountering and feasibility inspection
   ➢ Design of the purposed ICS

The above mentioned bullets categorize our plan of action. On the basis of the bulleting the project will be carried out chronologically. The CEPP project selection has already been carried out and the site visit of one week will be carried out shortly. Before that the proposal defense and selection of a suitable supervisor will be carried out. Then at the site out team will be divided into two groups one of which will be carrying out the interviewing with the local villagers and the other will be checking the current situation of cooking stoves in that locality. Although, there will be groups working in different sections, the share of knowledge, experiences and discussions will flow in parallel.
## GHANTT CHART

<table>
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<tr>
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<th>April</th>
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<tr>
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<tr>
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<td>Testing</td>
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<td>Installation at households of Jhyaku</td>
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- **Work Completed**
- **Work Remaining**
### COST ESTIMATION:

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<td>Workers’ wages</td>
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<td><strong>Total</strong></td>
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WORKS CITED
