

# **A Study on Home Application of Solar Photovoltaic System**

(A CASE STUDY OF MALAYANG-KOT VDC SYANGJA DISTRICT)

A Project Work Report

Submitted to Central Department of Rural Development

in the Partial Fulfillment of the

Requirements

for the Award of the Degree of Master of Arts

in Rural Development

**Rishikesh Dhakal**

Exam Roll Number: - 3943

TU Reg. No. 05-02-19-808-2000

Central Department of Rural Development

Faculty of Humanities & Social Science

Tribhuvan University, Kirtipur

Kathmandu, Nepal

May 2009

# Table of Contents

<b>Chapter Title</b>	<b>Pages</b>
Title Page	ii
Recommendation Letter	iii
Approval Letter	iv
Acknowledgements	v
Exclusive Summary	vi
Table of Contents	viii
List of Tables and Figures	x
List of Abbreviations and Acronyms	xi
<b>1. Introduction</b>	<b>1-5</b>
1.1 Background of the Study	1
1.2 Statement of the Problem	3
1.3 Renewable Energy Sources	4
1.4 Objectivities of the Study	4
1.5 Rational of the Study	4
1.6 Limitation of the Study	5
1.7 Organization of the Study	5
<b>2. Literature Review</b>	<b>6-24</b>
2.1 General Background	6
2.2 The Necessity of Energy Conservation	8
2.3 Energy Policy	9
2.4 Characters of Energy Utilization	9
2.5 Photovoltaic Theory	16
2.6 The Solar Resources	18
2.7 Application if Solar System	18
2.8 Economic Overview	21
2.9 Terminology	22
2.10 Cost Structure of PV System	22
2.11 Balance of System (BOS) Components	23
2.12 Prospective of Cost Reduction	24
<b>3. Methodology</b>	<b>25-28</b>
3.1 Rationale of the Section of Study Area	25
3.2 Source and Nature of Data	25
3.3 Research Design	29
3.4 Sampling Procedure	26
3.5 Data Collection Procedure	26
3.5.1 Focus Group Discussions	26

3.5.2 Observation	27
3.5.3 Key Information Survey	27
3.6 Methods of Data Analysis and Interpretation	27
<b>4. Introduction of the Study Area</b>	<b>29</b>
4.1 Malayngkot VDC	29
4.2 Climatologically Record of Syangja District	30
4.3 Infrastructure and Social Situation of Study Area	30
<b>5. Interpretation and Analysis of Data</b>	<b>33</b>
5.1 Structure of Sampled Population	33
5.2 Respondents by Cast/ Ethnicity	33
5.3 systems Educational Distribution of Respondent	34
5.4 Family Size of Sample population	36
5.5 Occupation of Respondent	37
5.6 Annual Income and Source of Income	38
5.7 Income Distribution Among Respondents	38
5.8 Energy Use Trends	39
5.9 Economic Benefit through Solar PV System	41
5.10 Problems on Solar home Photovoltaic System	43
<b>6. Summary, Conclusion and Recommendations</b>	<b>44</b>
6.1 Summary and Conclusion	44
6.2 Recommendation	46
I. References	a
II. Index I	c
III Index II	h

## Lists of Tables and Figure

Table 1.1: -Human Civilization and Development of Energy Technology and Use	3
Table 2.1: - Composition of Growth Rate of Primary Energy Consumption 1981-1990	7
Table 2.2: - Projection in Energy Demand in 5 Countries 1990-2005	8
Table 2.3: -Structure of Energy Demand Model	10
Table 2.4: - Estimated Reserved of Fossil Fuels, 2002.	11
Table 2.5: - Total Final Consumption by Sector in Selected Asian Countries, 2001	12
Table 2.6: - Challenges Related on the Energy and it's Prosperity	13
Table 2.7: - Selected Atmospheric Pollution	14
Table 2.8: - Cultural Ecological Model	15
Table 4.1:- Overall View of Malayankot VDC on Compare to Syangja District	29
Table 4.2: - Topographical Distribution of land in VDC of Malyankot	30
Table 4.3: -Demographic Trends of Malyankot VDC in a General Record	30
Table 4.4: - Infrastructures of the Malyankot VDC	31
Table 4.5: - Education Status of the VDC People	30
Table 5.1: - Cast Distribution of Study Area	34
Table 5.2: - Distribution of Study Population by Educational Status	35
Table 5.3: - Distribution of House by Family Size	36
Table 5.4: - Distribution of House-holds by Occupation	37
Table 5.5: - Source Income Distribution of House-hold	38
Table 5.6: - Distribution of Family Annual Income of Respondents	39
Table 5.7: - Application of Energy for Home Appliance	40
Table 5.8: - Showing the Annual Power Shaving by the Uses of SHPS	41
Table 5.9: - Respondents Give Their Respond on few Objective Questions	42
Figure 1.1: The Atmospheric Concentration of Greenhouse Gases like CO <sub>2</sub> has Grown Significantly since Pre-industrial Times.	2
Fig 2.1: - PV System Configuration	18
Fig 2.2: - Price and Efficiency of Crystalline PV Modules (wp- Watt Peak)	22

## Abbreviation/ Acronyms

AC	Alternate Current
BOS	Balance of System
CBS	Central Buero of Statistic
CDM	Clean Development Mechanism
CFL	Chlorofloro Lamp
DC	Direct Current
DDC	District Development Committee
GDP	Gross Development Process
IEA	International Energy Agency
IEC	International Economic Department
IPCC	Tnter-govermental Panel for Climate Change
LPG	Liquid Peterolium Gas
NEA	Nepal Electricity Authority
NPC	National Population Census
OECD	Organization for Economic Development Cooperation
Pa	Per Annual
PV	Photovoaltic
RAPS	Remote Area Power Supply
SHS	Solar Home System
SLC	School Leaving Certificate
SPVS	Solar Photovolatic System
TU	Tribhuvan University
TV	Television
UAE	United Arab Emirate
UN	United Nation
UNDP	United Nation Development Programme
US	United State.
USSR	United State of Soviet Republician
VDC	Village Development Committee
WHO	World Health Organanization