

**HIGHER TECHNICAL INSTITUTE  
MECHANICAL ENGINEERING COURSE**

**DIPLOMA PROJECT**

**ENERGY AUDIT IN A RESIDENTIAL HOUSE**

**BY: ANDREAS MOULASHI**

**JUNE 2008**

# ***Energy Audit of my Home***

**By**

**ANDREAS MOULASHI**

**Project Report**

**Submitted to**

**The Department of Mechanical Engineering**

**Of the Higher Technical Institute**

**Nicosia – Cyprus**

**In partial fulfilment of the requirements**

**For the diploma of**

**TECHNICIAN ENGINEER**

**In**

**MECHANICAL ENGINEERING**

**PROJECT SUPERVISOR:**

**Mr. Th. Symeou**

**Lecturer in Mechanical Engineering**

**TYPE OF PROJECT: INDIVIDUAL**

M 1045

HIGHER TECHNICAL INSTITUTE	PROJECT NO
	3768

**June 2008**

# CONTENTS

<b>Abstract .....</b>	<b>3</b>
<b>Introduction.....</b>	<b>3</b>
<b>Chapter 1. House under examination .....</b>	<b>5</b>
<b>Chapter 2. Energy used by the house under examination .....</b>	<b>7</b>
<b>Chapter 3. Electricity audit.....</b>	<b>9</b>
<b>3.1. Installed Electrical household appliances .....</b>	<b>9</b>
<b>3.2 Total Electricity Consumption.....</b>	<b>14</b>
<b>3.3. Analysis of the Electricity Consumption .....</b>	<b>14</b>
<b>3.4. Electricity Consumption by appliance .....</b>	<b>15</b>
<b>3.5. Graphical Analysis of the Electricity Consumption.....</b>	<b>18</b>
<b>Chapter 4. Oil Audit .....</b>	<b>21</b>
<b>Chapter 5. Gas audit.....</b>	<b>23</b>
<b>Chapter 6. Suggestions for improvements .....</b>	<b>26</b>
<b>Chapter 7. Cost analysis.....</b>	<b>29</b>
<b>7.1 .Payback period for Compact fluorescent lamps (CFLs) .....</b>	<b>29</b>
<b>7.2. Thermal Insulation .....</b>	<b>30</b>
<b>Chapter 8. Suggestions for further improvements.....</b>	<b>38</b>
<b>Conclusions: .....</b>	<b>40</b>
<b>References: .....</b>	<b>42</b>
<b>Appendices.....</b>	<b>43</b>

## **Abstract**

The purpose of an energy audit is to establish the basic relative costs of various forms of energy, their main uses and the principal points at which there is waste or inefficiency and the measures to be taken in order to minimise these inefficiencies.

An initial energy audit such as this does not need to be very accurate or sophisticated. The aim is to obtain results quickly and to improve accuracy in the light of experience. The results taken are approximations due to the lack of sophisticated measuring equipment and due to the fact that they are the energy consumed at a previous period.

The present study is an energy audit of my home situated in the town of Larnaca in Cyprus. It examines the electricity consumption by room, appliance and period of the year and provides methods, techniques and other common practices already applied to reduce total energy consumption. Suggestions are given for further improvements so that maximum energy conservation can be achieved.

## **Introduction**

The buildings sector accounts for 40% of the EU's energy requirements. That's why the European Parliament was decided to set in force the **Directive 2002/91/EC on the energy performance of buildings**. The objective of the Directive is to promote the improvement of the energy performance of buildings within the European Union and consequently to reduce the energy consumption and CO<sub>2</sub> emitted to the atmosphere.

Electricity is one of the most expensive forms of energy and it is the most widely used form of energy in Cyprus. Electricity is the form of energy which can be readily available and directly used to operate the majority of equipment and machinery in buildings and industry. Buildings consume a lot of electricity for lighting, heating, cooling, cooking, washing etc. Reducing electricity consumption in buildings is one of the most important parameters in the efforts made worldwide to conserve energy.

An energy audit is essential to be carried out in all buildings in order to trace the energy intensive areas, equipment and appliances. Having done this it is easier then to make improvements and changes and hence to reduce the electricity consumption.

## Chapter

Reduction of Electricity consumption can be achieved not only by spending money to replace old electrical appliances with new more efficient ones but also by following some simple rules and tips. Just by doing a few simple things that require no cost one may cut down on his electric bills.

Also another way to reduce energy consumption is to reduce the thermal losses in a building which occur either to poor thermal insulation or to thermal bridges which carry away heat. By reducing thermal losses to and from the external areas the energy consumed to heat the building is also reduced. Under affordable conditions a good thermal insulation can also provide:

- Comfortable, hygiene and pleasant living without disturbing the thermal balance of the human body.
- Money saving in energy consumption with minimisation of thermal losses from the building's shell.
- Minimizing of the original cost of construction and installation of central heating system
- Simultaneous protection from noises since most heat insulating materials also offer sound insulation
- Improvement of environmental protection because by reducing the heat losses we also reduce the oil consumption for heating and therefore the gases produced by combustion which are released into the atmosphere.

Whenever we save electricity, we do not only save money but we also reduce the demand for such fossil fuels as coal, oil etc needed to generate electricity. Less burning of fossil fuels also means lower emissions of carbon dioxide (CO<sub>2</sub>) which is the main cause of global warming.