

**COMPARATIVE ANALYSIS OF ENERGY CONSUMPTION
BETWEEN A FIVE-DAY AND A FOUR-DAY WORK
WEEK SCHEDULE OF CAVITE STATE
UNIVERSITY (2004-2013)**

THESIS

**MEL P. AMANDY
LAKSON N. ELIAS**

**College of Engineering and Information Technology
CAVITE STATE UNIVERSITY
Indang, Cavite**

April 2014

**COMPARATIVE ANALYSIS OF ENERGY CONSUMPTION BETWEEN A
FIVE-DAY AND A FOUR-DAY WORK WEEK SCHEDULE OF
CAVITE STATE UNIVERSITY (2004-2013)**

Undergraduate Thesis
Submitted to the Faculty of the
College of Engineering and Information Technology
Cavite State University
Indang, Cavite

In partial fulfillment
of the requirements for the degree
Bachelor of Science in Electrical Engineering



00008712

*Comparative analysis of energy consumption
between a five-day and four-day work week*
621.317 Am1 2014
T-5315

**MEL P. AMANDY
LAKSON N. ELIAS**
April 2014

ABSTRACT

AMANDY, MEL P. and ELIAS, LAKSON N., Comparative Analysis of Energy Consumption between a Five-day and a Four-day Work Week Schedule of Cavite State University (2004-2013). Undergraduate Thesis. Bachelor of Science in Electrical Engineering. Cavite State University, Indang, Cavite. Adviser: Engr. Efren R. Rocillo.

Effective energy consumption involves decision making that lead to the quality usage at lower operating costs. In a learning institution, energy consumption depends on the electrical equipment used, program schedules, number of users and facilities which equip various electrical loads. Cavite State University has shifted from a five-day work week schedule to a four-day workweek schedule to save energy consumption in all its units. Hence, the study aimed to determine which schedule in the Cavite State University is better by comparing and analyzing the energy consumptions between a five-day and a four-day work week (2004-2013).

Electric bills were obtained from the University Records Office for comparison and were used to analyze the energy consumptions between the two schedules. The analysis was done through comparison of the past electric bills of the university from AY 2007-2008 and AY 2008-2009 which involved both schedules. The conduct proper was held from January 21-30, 2014 by inspection and monitoring of ten selected buildings in the university. A clamp on-ammeter and a multimeter were installed to determine which building among the ten monitored buildings consumed greater amount of energy.

Findings revealed that the four-day work week schedule was found better than the use of the five-day work week schedule in terms of energy consumption.

Statistics showed that the tabulated t-value 0.0391 of was lesser than the computed t – value of 1.591 at 0.05 level of significance. This means that there was no significant difference on the energy consumption between the two schedules of the involved academic years. However, a four day work week schedule was still considered better than a five-day work week schedule because if all the buildings were constructed and operated during the five-day work week schedule with the increasing population in the university, the energy consumption would have doubled during that time.

The data contained in this study serve to provide users a better understanding of a five-day and four-day workweek making it easier to determine a suitable schedule to meet the lowest power budget. Energy consumption is highly dependent on the individual user's application; however, this study focused on providing several comparisons on two usages in a large population.

TABLE OF CONTENTS

	Page
BIOGRAPHICAL DATA	iii
ACKNOWLEDGMENT	v
ABSTRACT	vii
LIST OF TABLES	xi
LIST OF FIGURES	xii
LIST OF APPENDIX TABLES	xiii
LIST OF APPENDIX FIGURES	xv
INTRODUCTION	1
Objectives of the Study	3
Time and Place of the Study.....	3
Scope and Limitation of the Study	3
Significance of the Study	4
Definition of Terms	5
REVIEW OF RELATED LITERATURE	7
MATERIALS AND METHODS	15
Materials	15
Methods	15
RESULTS AND DISCUSSION	20
SUMMARY, CONCLUSION AND RECOMMENDATIONS	32
Summary	32
Conclusion	33

	Pages
Recommendations	34
REFERENCES	35
APPENDICES	36

LIST OF TABLES

Table		Page
1	Summary of the average daily energy consumption using monitoring and inspection in the four-day work week schedule	18
2	Monthly energy consumption	22
3	Paired samples statistics for monthly energy Consumption	22
4	Paired sample test for monthly energy consumption	23
5	Summary of the average daily consumption using monitoring and inspection in the four-day schedule, January 21-30, 2014	25
6	Population and energy consumption (2004-2013)	28

LIST OF FIGURES

Figure		Page
1	Average daily energy consumption in four-day schedule (January 21-30, 2014)	26
2	Daily energy consumption in the four-day schedule (January 21-30, 2014)	27
3	Energy consumption (kWh) of Cavite State University (2004-2013)	29
4	Population of Cavite State University (2004-2013)	29

LIST OF APPENDIX TABLES

Appendix Table		Page
1	Energy consumption of Cavite State University (2004)	62
2	Energy consumption of Cavite State University (2005)	62
3	Energy consumption of Cavite State University (2006)	63
4	Energy consumption of Cavite State University (2007)	63
5	Energy consumption of Cavite State University (2008)	64
6	Energy consumption of Cavite State University (2009).....	64
7	Energy consumption of Cavite State University (2010)	65
8	Energy consumption of Cavite State University (2011)	65
9	Energy consumption of Cavite State University (2012)	66
10	Energy consumption of Cavite State University (2013)	66
11	Energy consumption during the five-day work week	67
12	Energy consumption during the four- day work week	67
13	Summary of energy consumption of Cavite State University (2004-2013)	67
14	Summary of daily energy consumption in a four-day work week schedule per building, January 21-30, 2014.....	68
15	Summary of energy consumption by monitoring and inspection in the four-day work week schedule, January 21- 30, 2014	69
16	Summary of computed power demand of Cavite State University for 2013	70

**Appendix
Table**

		Page
17	Power distribution in the Administration Building, Cavite State University	72
18	Power distribution in the College of Arts and Science, Cavite State University	72
19	Power distribution in the College of Education, Cavite State University	73
20	Power distribution in the College of Engineering and Information Technology, Cavite State University	74
21	Power distribution in the College of Nursing, Cavite State University	75
22	Power distribution in the Department of Information Technology, Cavite State University	75
23	Power distribution in the Department of Industrial Engineering and Technology, Cavite State University	76
24	Power distribution in the Engineering Science, Cavite State University	76
25	Power distribution in the Office of the Student Affair, Cavite State University	77
26	Power distribution in the University Library, Cavite State University	78

LIST OF APPENDIX FIGURES

Appendix Figure		Page
1	Total amount (P) of energy consumption in 2004	80
2	Total energy consumption (kWh) in 2004	80
3	Total amount (P) of energy consumption in 2005	81
4	Total energy consumption (kWh) in 2005	81
5	Total amount (P) of energy consumption in 2006	82
6	Total energy consumption (kWh) in 2006	82
7	Total amount (P) of energy consumption in 2007	83
8	Total energy consumption (kWh) in 2007	83
9	Total amount (P) of energy consumption in 2008	84
10	Total energy consumption (kWh) in 2008	84
11	Total amount (P) of energy consumption in 2009	85
12	Total energy consumption (kWh) in 2009	85
13	Total amount (P) of energy consumption in 2010	86
14	Total energy consumption (kWh) in 2010	86
15	Total amount (P) of energy consumption in 2011	87
16	Total energy consumption (kWh) in 2011	87
17	Total amount (P) of energy consumption in 2012	88
18	Total energy consumption (kWh) in 2012	88
19	Total amount (P) of energy consumption in 2013	89
20	Total energy consumption (kWh) in 2013	89

21	Total amount (P) of energy consumption in five- day work week schedule	90
22	Total energy consumption (kWh) during the five-day work week schedule	90
23	Total amount (P) of energy consumption during the four-day work week schedule	91
24	Total energy consumption (kWh) during four-day work week schedule	91
25	Total amount (P) of energy consumption in 2004-2013	92
26	Total energy consumption (kWh) in 2004-2013	92
27	Monitoring and inspection of the circuit breaker	93
28	Installation of the clamp-on ammeter and multimeter	93
29	Measurement of the voltage and amperes using clamp-ammeter and multimeter	94
30	The researcher while recording the data of the amperes and voltages at the same time	95

COMPARATIVE ANALYSIS OF ENERGY CONSUMPTION BETWEEN A FIVE-DAY AND A FOUR-DAY WORK WEEK SCHEDULE OF CAVITE STATE UNIVERSITY (2004-2013)

**Mel P. Amandy
Lakson N. Elias**

7An undergraduate thesis presented to the faculty of the Department of Computer and Electronics Engineering, College of Engineering and Information Technology Cavite State University (CvSU), Indang, Cavite, in partial fulfillment of the requirements for the degree of Bachelor of Science in Electrical Engineering (BSEE), with Contribution No. CEIT-2013-14-062. Prepared under the supervision of Engr. Efren R. Rocillo.

INTRODUCTION

Energy consumption is generally the amount of electric power which is completely used up, destroyed, incorporated, or transformed into another form of energy after being generated, transmitted and distributed in a specific area in a particular period of time. The discrepancy between the amount of electricity generated and/or imported and the amount consumed and/or exported is accounted for as loss in transmission and distributions. The discovery of electrical energy has contributed much for the improvement of modern technology. Energy quality broadly encompasses the entire scope of interaction among electrical suppliers, the environment, the systems and products energized, and the users of those systems and products. It is more than the delivery of clean electric power that complies with industry standards. It involves the maintainability of that power, the design, selection, and the installation of every piece of hardware and software in the electrical energy system. Stretching from the generation plant to