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# Influence of Money or Morality on Energy Efficiency in the Homes of the Residents of California, USA.

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Bachelor's thesis  
February 2016  
International Business

Jyväskylän ammattikorkeakoulu  
JAMK University of Applied Sciences

Olubode, Ayorinde	Type of publication Bachelor's thesis	Date February 2016
		Language of publication: English
	Number of pages 85	Permission for web publication: Yes
Title of publication <b>Influence of Money or Morality on Energy Efficiency in the Homes of the Residents of California, USA.</b>		
Degree programme International Business		
Supervisor(s) Hundal Shabnamjit		
Assigned by		
<p>Abstract</p> <p>Energy efficiency is a topic that in recent times has become very prevalent. The research topic was chosen in order to understand the motivating factor that makes residents of California live in energy efficient homes and use energy efficient technology.</p> <p>This research was conducted as to get a clear understanding of what motivates residents to adopt the use of energy efficient technology and by also looking at companies that provide these products and service exploring how they conduct their business and why they produce energy efficient products.</p> <p>In search of the driving force, a 21-question online questionnaire was sent to the respondents. The questions were structured in a way that the desired demographic information of the respondents was acquired: their buying habits concerning energy efficient technology, if they lived in energy efficient homes, and their perception of energy efficiency.</p> <p>The author also conducted one to one interviews with three respondents, who are residents of California, in order to get an in-depth view of what they thought about the topic. The interviews were conducted in their homes. A mixed method approach was used including both quantitative and qualitative elements.</p> <p>It was found out that the motivation for consumers being energy efficient is to save money on their energy bills rather than prevent the effect of fossil energy on the earth. Companies spend money on research and development in order to manufacture products and services that are energy efficient as there is a demand.</p>		
Keywords/tags ( <a href="#">subjects</a> ) electricity, demand, consumption, forecast, conservation, energy efficiency, climate change, sustainability.		
Miscellaneous		

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## 1. Introduction

Energy is the ability to do work (U.S. Energy Information Administration, 2014). Energy can be derived in diverse forms like heat (thermal), light (radial), motion (kinetic), electrical, chemical, nuclear energy, gravitational (EIA 2014). Be it from vacuuming the house, washing, to heating during winter, we use energy in the process. Energy can be found in two main types: Kinetic energy and potential energy. The energy sources can be separated into two categories:

- Renewable: This is an energy supply that can be simply restored.
- Nonrenewable: This is an energy supply that cannot simply be regenerated.

Energy and energy conservation is a global issue as it is the pivot on which civilization and modernization stands on. We as a people can no longer live without the use of energy, there is an increasing demand for energy and as the population increases, there is an increase in the need and use of energy.

The demand for energy in homes, referring to electricity, gas from the utility companies, can be said to be influenced by a number of factors including: economic/demographic growth, electricity and natural gas rates, commitment to efficiency program, self-generation, and climate change impacts (California Energy Commission, 2015).

The state of California is known to be very arid, and there is a need to keep the homes cool as the temperature can be as high as 56 degrees Celsius in places like Death Valley. This calls for better cooling units in the houses running probably all day and almost all year round. With the drought entering its fourth year, the state is getting hotter, and this could signify that the earth's climate is not business as usual. "Warmer temperatures worsen drought by causing more evaporation from reservoirs, rivers and soil." (Fountain, 2015). Scientists believe that even though there might not be a direct link between the drought and climate change, the heat due to lack of rainfall makes it worse as a result of global warming.

There are signs that global warming is occurring and scientific data to back the claim. Residents in California are constantly reminded of the lack of rain and the intense heat. Companies are forced to consider sustainability when manufacturing products

and they also have to promote the idea of energy saving products to reduce greenhouse emissions.

*"Sustainability is based on a simple principle: Everything that we need for our survival and well-being depends, either directly or indirectly, on our natural environment. Sustainability creates and maintains the conditions under which humans and nature can exist in productive harmony, that permit fulfilling the social, economic and other requirements of present and future generations." (United States Environmental Protection Agency, n.d.)*

Even when faced with the dire situation and consequences of global warming and climate change, figuring out what consumers are doing or not doing and what changes companies are making to their products was the aim. In this research it was also about finding out if they truly believe in the call for change from the ways and products they are used to, the sources of energy they use and how much the earth means to them.

To further understand what sources of energy are available, there are both sustainable (renewable) and non-sustainable (nonrenewable) energy sources which can be used to produce electricity. We have five main sustainable energy sources supplies:

- Solar energy: This is gotten from the sun and with the use of devices like solar panels; it can be converted into electricity and heat.
- Geothermal energy: This is the heat from the earth's crust that can be used for various purposes, including heating the house.
- Wind energy: This form of energy is tapped using wind turbines and is becoming increasingly popular.
- Biomass or Biofuel can be gotten from trees, ethanol and biodiesel from corn, potato, cassava etc.
- Hydropower: This is tapping the energy from water current with the aid of turbines.

Basically, non-sustainable energy supply constitutes the bulk of our energy supply. They are called fossil fuels e.g. oil, natural gas, and coal for the reason that they were being created for more than millions of years as a result of the act chemical activities on remnants of deceased plant life and creatures in the earth's center which con-

verts it. An additional non-sustainable energy supply is uranium, that possess atoms capable of being divided through nuclear fission with a byproduct of heat and electricity.

The scientific communities, different governments, religious bodies, environmental activists, just to mention a few, have all in various ways brought to our attention the impacts of greenhouse gases, the consequences of our actions as humans on the planet. According to "the Pope's 10 commandments on climate change", he said "Environmental responsibility can significantly affect the world around us, such as avoiding the use of plastic and paper, reducing water consumption, separating refuse, cooking only what can reasonably be consumed...planting trees, turning off unnecessary lights." (Burke, 2015).

With all this information around us, this thesis was aimed at understanding the energy consumption dynamics, energy efficiency efforts of the residents of California and ultimately, their energy behavior. To find what drove the residents to making energy efficient decisions as regards to building homes efficiently or adopting the energy efficient technology.

"We use renewable and nonrenewable energy sources to generate the electricity we need for our homes, businesses, schools, and factories. Electricity powers our computers, lights, refrigerators, washing machines, and heating and cooling systems." (EIA, 2014).

Energy usage for residents and demand is influenced by ranges of factors, the type of house, where it is located and the climate. The single-family detached housing unit is the most common architectural design. According to the housing statistic survey conducted by Infoplease, the state of California has 12,214,549 total housing units (Infoplease, 2015) see table one.

Table 1 Housing Statistics California (Infoplease,2015)

UNITS INSTRUCTURE	NUMBER	PERCENTAGE
1-unit, detached	6,883,493	56.4
1-unit, attached	931,873	7.6
2 units	327,024	2.7
3 or 4 units	697,779	5.7
5 to 9 units	722,827	5.9
10 to 19 units	619,092	5.1
20 or more units	1,462,793	12.0
Mobile home	538,423	4.4
Boat, RV, van, etc.	31,245	0.3
<b>Total</b>	<b>12,214,549</b>	<b>100.0</b>

These figures clearly show that the bulk of energy use goes to the residents of single unit detached houses.

California gets most of its energy from natural gas having consumed about 2,500 trillion BTU in 2012. Energy is one aspect of life that the majority of household income is spent on with natural being the highest (see figure one).

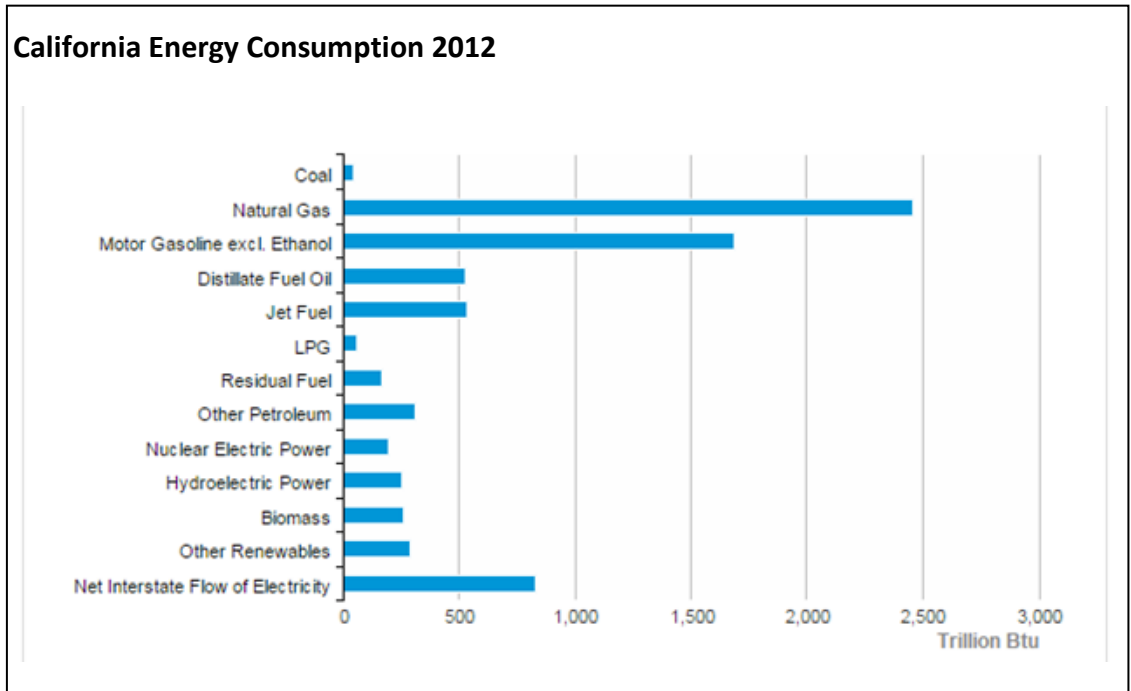


Figure 1: Energy consumption in the state of California (EIA, 2014)

The table below further breaks down into the number of houses that use utility gas to generate heat, electricity or other alternatives. 70.5% of the total housing units in California use utility gas while electricity ranks second with about 21.8% of the total (see table two).

## House Heating Fuel

Table 2: Number of houses and the type of fuel used for heating (Infoplease,2015)

Utility gas	8,114,829	70.5
Bottled, tank, or LP gas	434,972	3.8
Electricity	2,505,406	21.8
Fuel oil, kerosene, etc.	36,675	0.3
Coal or coke	734	0.0
Wood	204,699	1.8
Solar energy	13,508	0.1
Other fuel	27,791	0.2
No fuel used	164,256	1.4
<b>Total housing unit</b>	<b>12,214,549</b>	<b>100%</b>

From the tables we can see the breakdown of sources of energy in homes. Fossil fuel constitutes the bulk of our energy source. There are many factors that impact the price of electricity which include the cost of fuel, such as the price of coal or natural gas used in generating electricity, power plants have overheads associated with them, supplying the electricity generated also contributes to the cost, weather conditions for instance, severe weather have been known to destroyed electric grids thereby adding expenses to and lastly, policies by government contributes to the cost.

*“The cost of generating electricity actually changes minute-by-minute. However, most consumers pay rates based on the seasonal cost of electricity. Changes in prices generally reflect variations in electricity demand, availability of different generation sources, fuel costs, and power plant availability. Prices are usually highest in the summer when total demand is high, and when more expensive generation is added to meet the increased demand”*(EIA, 2014)

The way we look at energy consumption has changed over the years and people are looking for ways to save on their energy bills, some are looking at reducing their carbon footprint. The reasons why people try to be energy efficient differ and understanding of these reasons from the view of the consumers and how the companies

that manufacture products make decisions as a result is the reason I wrote this thesis.

The issue of global warming, price of crude oil, price of energy in general are not going anywhere and this is the reason why I think understanding what makes consumers buy energy efficient home and technology is very crucial. If it is a financial drive/economic incentive or just doing the right thing that curbs power consumption.

So as a result there are reasons why people would consider energy efficient technology and alternative energy and we can say that energy Efficiency is “using less energy to provide the same service” (Lawrence Berkeley National Laboratory, n.d.). It is becoming increasingly important for today’s home to be energy efficient. For instance, if we change a single layer window in a house with an energy-efficient one, the new window stops heat from passing through in the winter, so you save energy by using a lesser amount of your heating system or electric radiator while still staying comfy. During summer, we would not be running our air conditioners as often because efficient windows keep the heat out and we save electricity in the process. Likewise during the winter, the warm air stays in and cold air from outside is kept out. Furthermore, it could be replacing an appliance such as a television, dish washer, office equipment e.g. computer or printer, with ones that are energy efficient, the newer equipment will provide the same service, but use less energy. In the long run this will save money on energy bill, and reduce the amount of greenhouse gases going into the atmosphere.

“Consumer demand for energy efficient homes that feature lower energy costs, greater comfort, and other benefits, has been growing steadily during the past decade” (CNT Energy & National Home Performance Council, 2013, p. 4).

We cannot talk about energy efficiency without including the policy makers. For instance the California Statewide Residential Energy Efficient Program (CalSPREE) offers rebates and incentives for a wide range of appliances and whole house programs to single and multi-family residents (California public utilities commission, 2013). This type of incentive program would be further discussed as it is used by policy makers to motivate consumers into participation. This sort of push and pull strategy contributes to the energy behavior pattern of residents. The intrinsic and extrinsic factors

contributes to how people decide on energy consumption and as a result the government and policy makers know these and design their laws and incentive programs around it.

There are also programs like the weatherization assistance program which is a federal government initiative to help low-income residents upgrade their homes, making it energy efficient. They get different upgrades like weather-stripping to doors and windows, heating and cooling systems, electrical system and some other electrical appliances. This is a federal initiative by the U.S. Department of Energy (DOE) which “makes available grants to states, territories, and some Indian tribes to improve the energy efficiency of the homes of low-income families.” (Office of Energy Efficiency and Renewable Energy, n.d.).

Energy efficient homes bring a level of comfort and also improve the overall health of the residents. The energy consumption from renewable energy sources is relatively low and it can be seen that the dependence on fossil energy is high. The energy bill for July 2014 was higher than expected with Southern California Edison raising residential electric rates across the board, with average energy user seeing their bills increased by 8 percent, for example the average monthly bill in Los Angeles, California is \$120.63. According to an article in the Desert Sun, California Public Utilities Commission approved the rates increase earlier this summer under an industry-backed law known as AB 327. It further stated that critics say it could harm the rooftop solar industry and reduce incentives for energy conservation. The law allows utilities to spread cost more evenly across residential energy users.

This is said to be a preview of steeper hikes in some consumer energy bills. This makes it imperative that consumers make smart choices by making their homes energy efficient.

There are various types of energy efficient products and methods of constructing the homes that are at the disposal of families. It is sometimes a fear that energy efficient homes are very expensive either to buy or to upgrade existing homes. It is also important to say that energy can be saved while improving the home's comfort and helping the environment by making the home more energy efficient. Energy efficien-

cy saves more which can be in turn be invested into other green technologies to make the home more healthy, comfortable and sustainable.

There are scientific studies that imply that our earth is getting warmer. There are people that believe this to be absolute fallacy. There is a movement towards cleaner and better technology that is not as harmful to the earth. Companies are making products to this effect and consumers are adopting these technologies for different reasons. As a result, there are growing demands for these technologies, government is creating policies that mandates or facilitates the movement to cleaner energy. Below is a graph that shows the per capita personal consumption expenditures (PCE) in the state of California on gasoline and other energy goods.

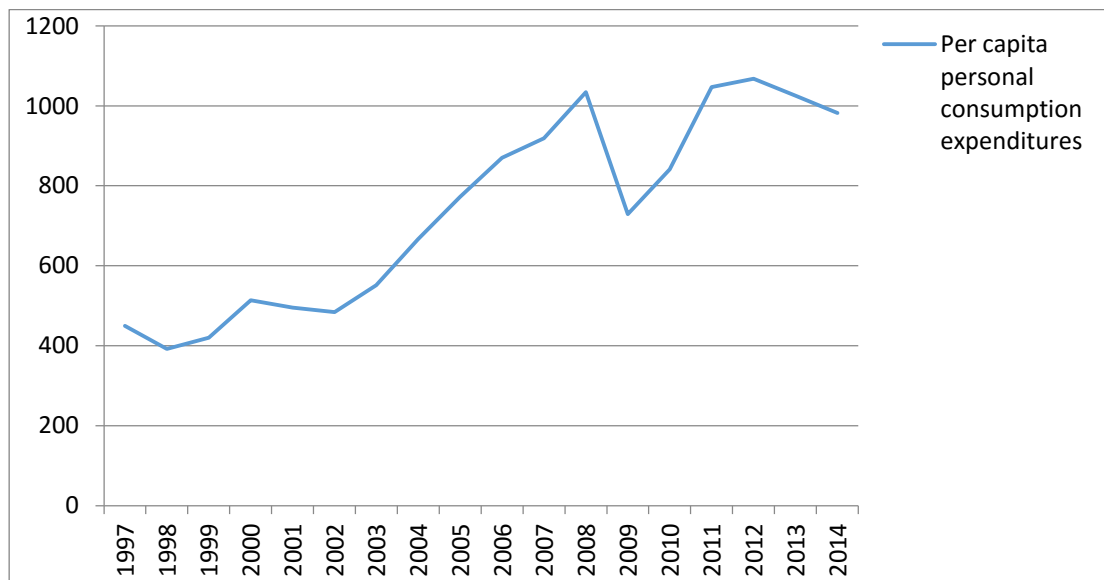


Figure 2: Personal Consumption Expenditure (PCE) on gasoline and other energy goods for California (Bureau of Economic Analysis, 2015).

In the graph above, an average of \$982 was spent on gasoline and other energy related goods for the year 2014.

"Per capita income is the mean money income received in the past 12 months computed for every man, woman, and child in a geographic area" (Census Bureau, 2014).

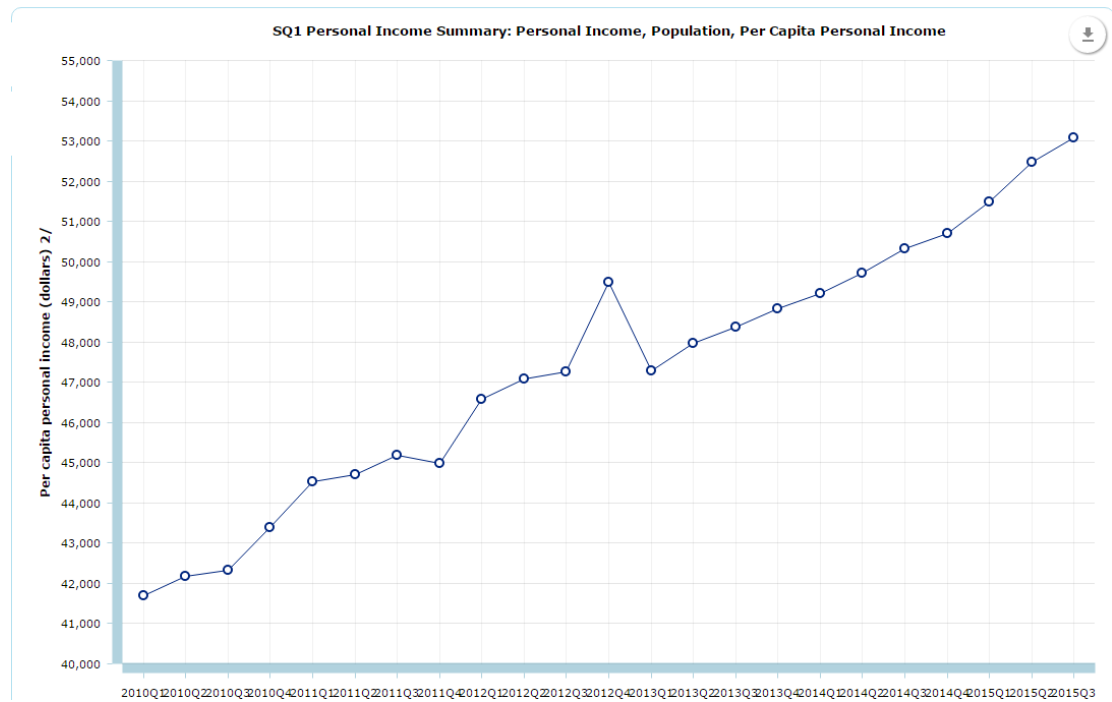


Figure 3: Per Capital Income in California 2010-2015 (Bureau of Economic Analysis, 2015).

The per capital income in the state of California for 2014 was \$50,691. This makes the amount spent on gasoline and other energy related goods for the year 2014 approximately 2% of per capital income. This makes the state of California the fourth lowest in the US according to the LA Times.

### 1.1 Climate and the impact of climate change

“Scientists have high confidence that global temperatures will continue to rise for decades to come, largely due to greenhouse gasses produced by human activities” (Shaftel, n.d.). We have polluted the earth and caused a lot of physical damage to it, and as a result there are changes occurring. The earth is getting warmer, the ocean level is rising, and there is air pollution and sea pollution amongst other things. There is a huge demand for energy and since most of it comes from non-sustainable sources and since the by product is poisoning the earth, there is a need for efforts to reverse the harm that we have caused the earth, and there is a movement in that

direction. The scientific community is clamoring for changes in our sources of energy and the way we consume energy.

As a matter of fact, “The Earth’s climate is changing” (United States Environmental Protection Agency, 2014). We have seen that the temperatures are rising, there are changes in the way the snow fall, and the rainfall in different parts of the world has changed from what it used to be. Scientists have determined that they are as a result from carbon dioxide and greenhouse gasses, which have increased due to human activity. These gases that add to greenhouse effects include: water vapor, carbon dioxide, methane, nitrous oxide, chlorofluorocarbon (CFCs).

Unfortunately, many individuals are unaware, ignorant, not fully informed, or absolutely do not care about the impact we have on the planet. There are consequences of having a high concentration of greenhouse gases in the atmosphere, and they include warmer regions, increased evaporation, drought in some cases, increasing sea level amongst others. (Shaftel, n.d.)

## 1.2 Sources of Greenhouse Gas Emission

There are different sources of GHG emissions in the state as they all require energy in one form or the other. For an overview of the sectors by emission rate in the State of California of the time period 1990-2012, see figure four.

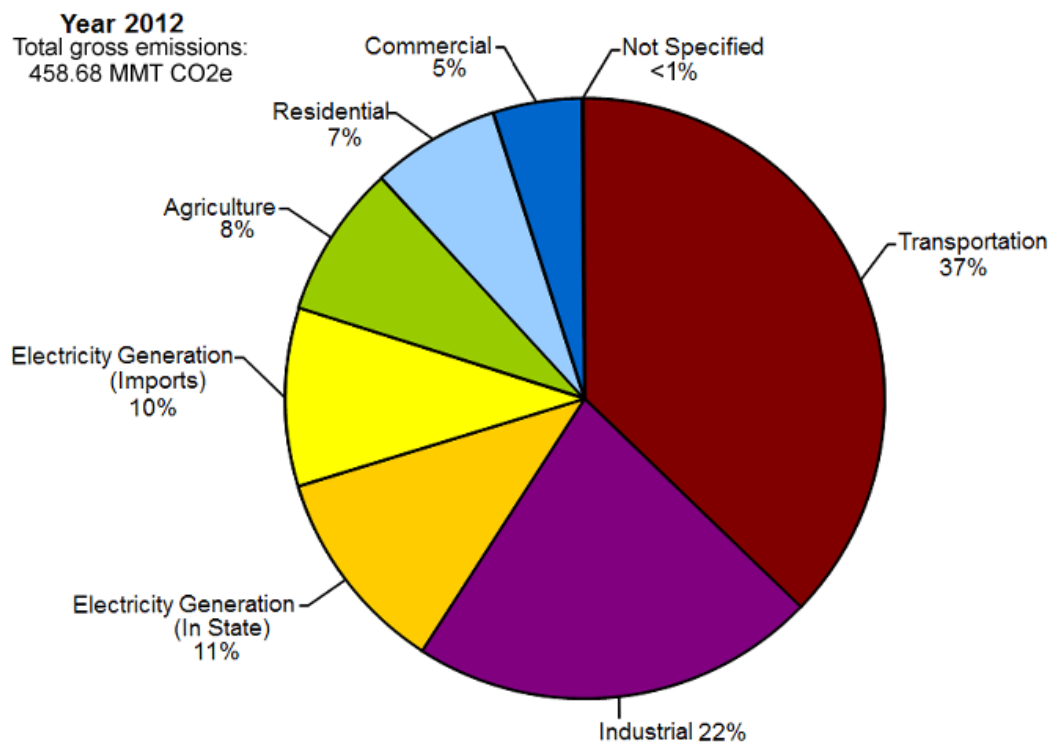


Figure 4: California gas emissions by sector (Air Resources Board, 2014)

Since this thesis is focuses on the residential sector of the state of California, we already know that fossil fuels are the largest source of energy used in the state, and that greenhouse gas emissions also come from the management of waste and wastewater, from leaks in refrigerants but there are also indirect emissions from electricity consumption in homes (EPA, n.d.) with the commercial and residential housing accounting for 7% of the total greenhouse gas emissions.

Furthermore, When we talk about utility in the United States, we mean two things which are power generation and distribution. When it comes to distribution, there is a monopoly because there are not enough gains to cover the costs if there is competition because that will mean having two sets of power distribution lines (Worstall, 2013).

According to the California Energy Commission, the five largest utilities and the total electricity consumption (in 2014) are:

- Southern California Edison Company (SCE) - 82,849 million kilowatt-hours
- Pacific Gas and Electric Company (PG&E) - 82,840 million kilowatt-hours
- Los Angeles Department of Water and Power (LADWP) - 27,628 million kilowatt-hours
- San Diego Gas & Electric (SDG&E) - 17,670 million kilowatt-hours
- Sacramento Municipal Utility District (SMUD) - 10,319 million kilowatt-hours

" The installed capacity of the 1,051 in-state power plants (greater than 0.1 megawatts - MW) totals 86,883 MW. These plants produced 198,908 gigawatt-hours of electricity in 2014." (California Energy Commission, n.d.).

### 1.3 Ways to improve the energy efficiency of the home

#### 1.3.1 Seal and Insulate

Too much air into and out of the home could flow through outer walls, ceilings, windows, doors and floors. There are holes and that can allow enough airflow in houses as much as when a window is open so heating and cooling takes longer. In order to save money and energy, and also to increase comfort sealing and insulating the shell of a home needs to be done.

Windows also account for a rise in heating and cooling bill as cold air can get into the home in the winter if the windows are leaking and the warm air that has been generated indoors escapes. Likewise in the summer, the air conditioners work harder to cool the air as the windows can be sunny. It is therefore obvious that energy-efficient windows, doors and skylight can reduce energy costs.

#### 1.3.2 Heat and Cool Efficiently

Efficient heating and cooling can be achieved by learning how to properly install and use a programmable thermostat to save energy. There must also be annual maintenance to ensure that the heating and cooling systems perform well. In a typical home that has conditioned air, about 20 percent of the air moving through the duct is lost to leakage as some of the connections might be poorly sealed. This leads to high utili-

ty bills and it makes it difficult to keep the house comfortable even though the thermostat is correctly set in the house. There is energy efficient equipment that carry the ENERGY STAR, which is a great start to replace old equipment with new. This also means that the new equipments must be installed properly in order to get desired results.

### 1.3.3 Hot Water Equipments

We all use hot water for various reasons at home ranging from cooking, bathing, to washing. This makes it a major monthly expense and therefore the need to reduce the monthly bills by looking for ways to reduce the time and energy need to heat the water, by resulting to buying energy efficient heaters, or tank less heaters, or even solar powered heaters.

## 2. Research objective, strategy and problem

This study was undertaken to see if the residents of California are energy efficient and understand why they are or why they are not. Money vs. morality can be said to be extrinsic or intrinsic in nature as they influence the decision making process of the consumer and the way we use energy in our daily lives at home.

Consumers always try to make the right decisions all the time, either by buying products that would help save money in bills, versus making their purchasing decisions because the product is manufactured to help save the earth or manufactured by a company with best practices. This thesis also aimed to show the effect money or morality has on California residents towards energy efficiency in homes. With the aim of reducing energy bills, water wastage and also improvement of overall health, it has become imperative that families decide to either build homes that will be energy efficient, upgrade their existing home or buy appliances that will aid in energy efficiency. One aim of the study was to find out if there is a consumption pattern, steps and measures that families take to ensure that their homes are energy efficient and to find out what motivates them to make their homes such.

I also analyzed two companies Haier and AB Electrolux respectively because they are major manufacturers of household products and have a strong presence in Califor-

nia. I wanted to see how these companies marketed their products and positioned themselves to the consumers as a result of how the consumers think about the entire idea of energy efficiency. I also looked at the company's financial statements to see if they put their money where their mouth is and not say they are committed to their stake holders, and to green technology but do the opposite.

California is the most populous U.S. state with a population of 36,332,521 (U.S. Census, 2013). As a result it is the country's largest user of energy but due to the mild climate and proactive legislation its energy consumption is one of the lowest per capita. I wanted to see what the residents did during this long drought or the way they thought as currently there are calls by the state to reduce energy consumption, even water consumption as "Delivering water and wastewater services is also an energy-intensive effort, as the water is treated, pumped to our homes and businesses, then pumped to wastewater facilities to be treated again." (EPA,2012)

## 2.1 Methodology

This is a descriptive research as "the main idea behind using this type of research is to better define an opinion, attitude, or behavior held by a group of people on a given subject." (Penwarden, 2014). With regards to energy efficiency, how the residents see the climate change phenomenon, and what they are doing in respond to what they perceive.

It is also a descriptive research study with "a one-time interaction with groups of people cross-sectional study." (Office of Research Integrity, n.d.). The required data for this research was collected through mixed method: primary research qualitative (interpretivist) method by interview of respondents, quantitative method (positivist) through the use of web based structured questionnaires which is easier to deploy and less complex for the respondents, and secondary research data from online sources.

Mixed method approach has its advantages as there is no one method of data collection that is perfect. So if the mixed method approach is used, the shortcoming of a particular data collection method can be offset by the other. (Tashakkori & Teddlie, 2003)

The in-depth interview was conducted on 3 respondents who were resident of California chosen at random and I chose this method of data collection because it gives an in-depth knowledge of the respondents. Provides understanding and description of people's personal experiences of phenomena i.e., the endemic or insider's viewpoint (Johnson & Christensen, n.d.).

For my survey sample, I used probabilistic methods (i.e., random selection) to generate a sample as they provide the most valid or credible results because they reflect the characteristics of the population from which they are selected ("Sampling: Types of samples," n.d.), non-probability sampling would have required me to use my subjective judgment but probability sampling issued because the procedures used to select units for inclusion makes the smaller group representative of a larger group. A survey of 21 questions was sent out online to people and the data was analyzed using SPSS.

I interviewed three respondents and they fall into different demographics ranging from a senior citizen, baby boomer and generation y. They all are individual home owners with their own families respectively. This was to figure out how different generations thought and how they viewed the usage of energy. Although this sample size is not representative of the population, it shows how people in different generations think which serves as a buttress.

## 2.2 Research Problem

The concerns about climate change and how it affects everyone cannot be ignored. There are media reports, scientific evidences and physical evidences for example the extreme heat, drought, rising sea levels and flooding, that begs the question if this is true. If so, then what is the implication or how does it impact the purchasing habits of consumers or the manufacturing of products by companies.

Talking about energy efficiency and how it impacts the residents of California, how they view it, either from the monetary side which is the cost of either being energy efficient or not, versus the morality of either adopting energy efficient products and technology. Is there a reason for making decisions regarding energy efficient products or technology?

There are companies that produce these products and is this a case where they are probably profiting from the green earth trend? Is climate change real and the impact to the earth? What do residents think when they consume energy? Is energy efficiency something that they think of when they consume energy?

According to the Potsdam Institute for Climate Impact Research, "Climate change will affect all parts of society, with serious consequences at regional and global levels". Thus, there is reason to believe that there is a justification for adoption of technologies that will help reduce of carbon emissions. Recently in Paris there was a ground breaking unanimous climate agreement by 195 states worldwide "to limiting global warming to well below 2 degrees Celsius and bring down greenhouse-gas emissions to net zero within a few decades" (Potsdam Institute for Climate Impact Research, n.d.).

This is no doubt a valid reason to view the existence of climate change as a global threat. With this being said, understanding the consumers and what is responsible for the choices that they make can be likened to the black box theory and this thesis identifies what these input factors are. "Knowing what's inside the black box is not essential for determining how behavior is governed by its environmental antecedents and consequences" (Driscoll, M.P, 2005).

The residents of California, USA were explored in order to determine their behavior, the effect policy makers have on their habits and how companies react to these behaviors. The thesis was conducted in order to find out the best ways consumers were energy efficient, if they were energy efficient out of the goodness of their heart which on this case is the intrinsic value, as global warming is an alarming situation. On the other hand, I wanted to find out if financial incentives like rebates, tax reductions and other policies were more of an impetus to making consumers take active steps towards energy efficiency which is the extrinsic value.

This research problem is relevant as it is intended on finding out the driving force behind the purchasing decisions and habits of the residents of California. Since energy efficiency is a situation that we are faced with on a daily, the people have to curb their energy usage for whatever reason that justifies their actions in their head. This reason could be as simple as trying to heat up the house effectively in the winter in

other to create the required comfort that is needed for the family and as a result what do the companies do.

## 2.3 Research Questions

- Is global warming the reason for energy efficiency?
- Are residents just trying to save hard earned money?
- Are companies having effect on the way people think?

# 3. THEORETICAL FRAMEWORK

## 3.1 Energy Efficiency Gap

Energy efficient technologies are not being adopted by some people and be said to be "The apparent reality that some energy-efficiency technologies that would be socially efficient are not adopted" (Newell & Siikamäki, 2014). There are various researches and articles that have been written in regard to bridging the energy efficiency gap. They state that there is a gap in the adoption of energy efficient products by consumers although there are future benefits when such technologies are adopted and also to mention that energy efficient products help save the earth as they reduce greenhouse gas emissions.

There are also various reasons for the energy efficiency gap and why it remains untapped.

- Principal agent problem: "The principal-agent problem develops when a principal creates an environment in which an agent's incentives do not align with its own" (Investopedia, n.d.). In relations with consumers that use energy efficient products, and the reason why there should be an increased usage of energy efficient products is because the government, companies, and consumers are not aligned.
- Information lacuna or inadequate information about the products: There are cases where individuals and firms make decisions to buy less than they would have if adequate information was known.

"How cost-effectiveness is defined substantially affects how much of our nation's efficiency potential will be accessed and whether consumers will benefit from the lower energy costs and environmental impacts that would result." (EPA, 2008). So as a result there are concerns about the discount rate of energy efficient products. " Much discussion surrounding the energy-efficiency gap is couched in terms of arguments about the appropriate discount rate to use in evaluating energy savings." (Jaffe & Stavins, 1994). " Since costs typically occur upfront and savings occur over time, the lower the discount rate the more likely the cost effectiveness result is to be positive" (EPA,2008).

There is also inadequate information about energy efficient products and about how what the perceived benefits are. For instance, with the labeling of products that are energy efficient, the consumer is not really sure how efficient they are and how they will save them money. Below is an example of a label with adequate information and one without adequate information.

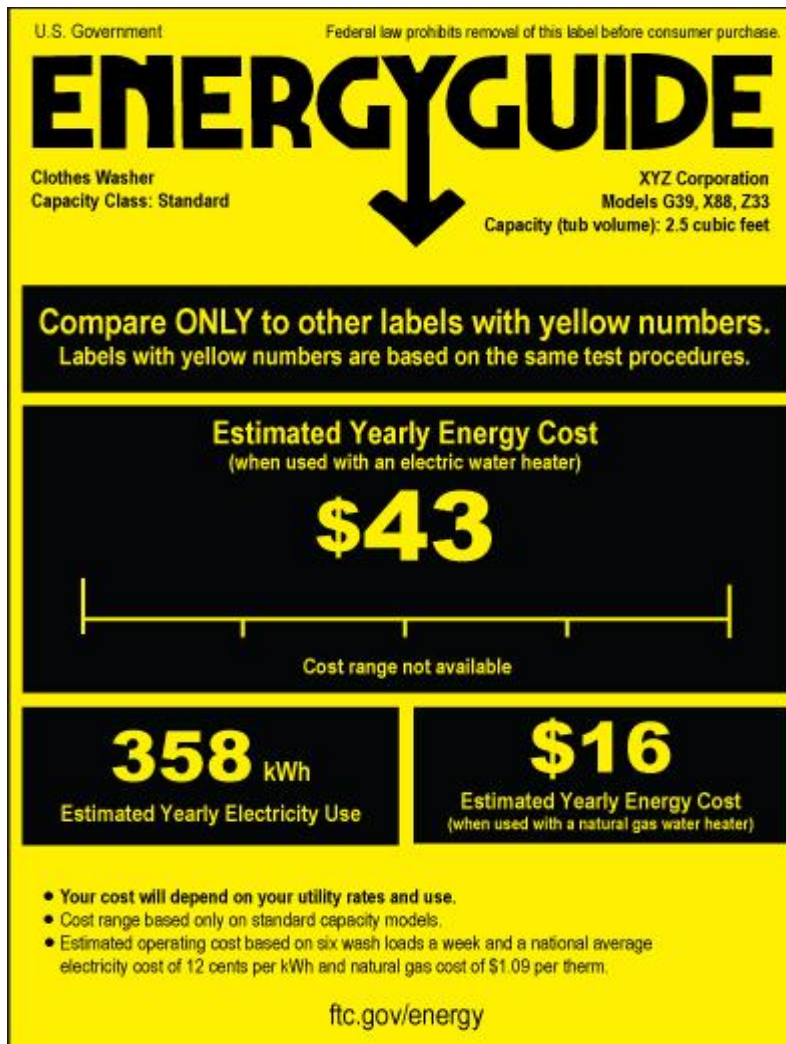


Figure 5: Adequate information labeling ([www.consumer.ftc.gov](http://www.consumer.ftc.gov))



Figure 6: Inadequate information labeling ([www.whe.org](http://www.whe.org))

The labeling of products can give an understanding of how the product will save consumers money and also reduce CO<sub>2</sub> emissions. This helps in the purchasing decision as most people do not know how these efficient products work.

### 3.2 Black Box Theory

By definition, "The black box model of consumer behavior identifies the stimuli responsible for buyers behavior." (MBASKool, 2008). This theory sees the human mind as the "black box" and is meant to understand what are the inputs that stimulates the buying response. This can be illustrated in table 4 "focusing on when, why, how and where people do or do not buy products. " (Sandhusen, 2000)

Table 3: Black box model showing consumer response based on stimuli, consumer characteristics and decision process. (Sandhusen, 2000)

ENVIRONMENTAL FACTORS		BUYER'S BLACK BOX		BUYER'S RESPONSES
Marketing Stimuli	Environmental Stimuli	Buyer Characteristics	Decision Processes	
Product	Economic	Attitudes	Problem recognition	Product choice
Price	Technical	Motivation	Information search	Brand choice
Place	Political	Perceptions	Alternative evaluation	Dealer choice
Promotion	Cultural	Personality	Purchase decision	Purchase timing
		Lifestyle	Post-purchase behavior	Purchase amount

With knowledge of this theory, companies can target customers with the desired marketing campaign which is the input stimuli with the aim of achieving higher sales. Exposing them to the type of advertisements that they want their products to be identified with, therefore also creating a brand image for themselves e.g. energy efficient products, smart technology etc.

### 3.3 Factors Influencing Behavior

*"An economic theory of consumption behavior which asserts that the best way to measure consumer preferences is to observe their purchasing behavior. Revealed preference theory works on the assumption that consumers have considered a set of alternatives before making a purchasing decision. Thus, given that a consumer chooses one option out of the set, this option must be the preferred option." (Investopedia, n.d.)*

There are various factors that influence the behavior of individuals and I would be analyzing them as I want to show links as to how companies understand this and how they can use it to their advantage. To further understand the relationship between the factors, figure seven shows an illustration.

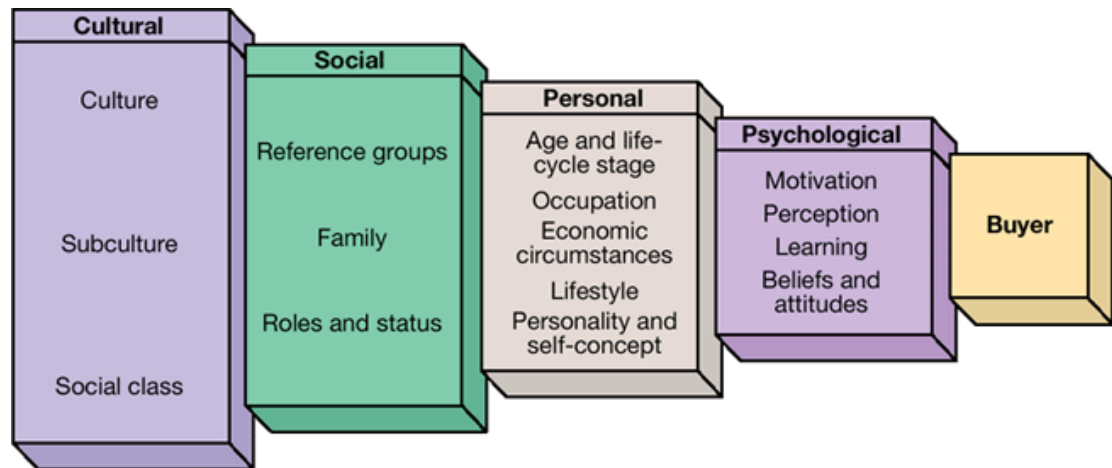


Figure 7: The factors influencing behavior (Kotler, Bowen, & Makens, 2006)

Every individual is unique as they all have different characteristics influencing how we react to the stimuli and the decision process affects the choices they make in deciding the outcome. As energy consumers, the purchasing decision can be affected by cultural, social, persona and psychological personality.

### 3.3.1 Cultural Factor

This is an immense influence on the way people behave as we all have different ways we were taught to do things. There are some cultures or families that buy a refrigerator for extra storage of food while others would see it as not a necessity . Our consumer behavior pattern and reasons for buying a product can be really influenced by the way we see things. Cultural factors will be examined as culture, subculture, and social class, by seeing the part and extent of influence.

Culture: "Determinants of culture learned as a child are changing in societies from Chile to California." (Kotler et al., 2006). Culture is an identity and everyone wants to

be associated with something. This as a results influences our buying habits as we want to look the part. For instance in there is a cultural shift to people being healthy and the idea that you have to watch what you eat, this has created a demand for kitchen equipments that help make healthy meals like juicers. With the internet revolution, it is becoming increasing easy to get access to information, so there are companies manufacturing products and services that help consumers get healthy recipes online.

Subculture: "Each culture contains smaller subcultures" (Kotler et al., 2006). For instance in the city of California, there is a presence of Hispanic consumers which are from Cuba, Mexico, Central America, South America, and Puerto Rico origin that constitute as a subculture as the marketers need to tailor their products to the segment of people.

Social Class: According to Kotler et al, Social scientists have identified the seven American social classes: upper uppers (less than 1%), lower uppers (2%), upper middles (12%), middle (32%), working (38%), upper lowers (9%), and lower lowers (7%). In this situation, the different classes tend to share a lot of habits in common. Their purchasing power is responsible to the type of equipments they buy and how they want to be seen as a status statement amongst their peers. Thompson (n.d.) says that the United States is a consumer culture and this type of consumer culture stresses the influence of lifestyle and the use of material goods to achieve happiness and contentment.

### 3.3.2 Social Factors

There are social factors influencing consumer behavior that companies need to be aware of and this case they include consumers' groups, family, social roles, and status.

Groups: Groups can influence the way people perceive a product, attitude to the product, create a band wagon effect on individuals to see a product in a different light. Companies need to understand they type of groups that their customers are in to be able to influence their choices. So in the instance of health enthusiasts, they can influence the group members by influencing opinion leaders.

Family: According to Management Study Guide (2013), this is the primary influence on individuals as it is normal for people to discuss with their immediate family members prior to buying a particular product or service. The family members have a level of influence that might support an individual's decision to buy a particular product, stop him from purchasing it or suggest few other options.

Roles and Status: As an organization, the role and status of their prospective buyers need to be understood. According to Thompson (n.d) "consumer culture theory emphasizes the sociological and psychological impacts of buying and spending behavior. The desire to keep up with one's neighbors or economic peers, the belief that purchasing a new gadget or other piece of merchandise will improve quality of life and the emphasis on shopping for leisure are all parts of."

### 3.3.3 Personal Factors

There are a couple of variables in this category that can influence the purchasing habit of an individual and they could be:

Age and way of life: In the individual as in the case of physical fitness, buying physical fitness equipments can be seen as a luxury for young buyers or not really in their list of priority. For the older population, they might see it as a change in habit from a previous life of consuming unhealthy food and to help avoid health problems. Companies should identify the age, way of life and the factors that influence the buying decisions of their customers as for instance the average young adult living in California which is sunny and outdoor life is really popular, would see the need to be physically in shape all year round and they probably would be into buying fitness equipments more than their counterpart that lives in a state or country that has snow most of the year and hardly does outdoor sports.

Occupation and Economic Situation: These are also factors that can have a great impact on the products that people buy. Now that the United States is recovering from a recession, the consumer habits will also be changing.

*Technology- and social-network-enabled shopping strategies will allow this trend to pick up steam well into the recovery and beyond. Exactly what consum-*

*ers buy may change, but their facility in navigating the options will prove durable—as will their readiness to shift allegiances. (Flatters & Willmott, 2009)*

Depending on the occupation, purchasing power, economic situation of the country, companies should be aware of these factors as this can influence their products and prices.

Lifestyle: "Individuals and families demonstrate different styles in performing the functions of maintaining their social and economic systems." (Williams, 1972). We act on the way we think that our life should be and that influences the choices that we make regarding what we purchase. So in the case of a person who has a healthy lifestyle, they will prefer to eat healthy and buy equipments or foods that aid them in leading such a lifestyle.

Personality and Self-concept: " Consumer behavior is sometimes guided by self-related motives (e.g., self-enhancement) rather than by rational economic considerations." (Cisek et al., 2014). The personality of an individual also affects the choice of products and services that they buy. " In order to attract more customers, many brands are trying to develop an image and a personality that conveys the traits and values - real or desired – of consumers they are targeting." (Perreau, n.d.). So in the case of the health conscious individuals, the companies will have to make products or marketing campaigns that appeals to their image. There can be ads that show previously larger people and then after using the products see significant results or are in better shape. They could also be targeting the vanity of the clients know that they do so just to show off their great body or to make a statement to their peers.

### 3.3.4 Psychological Factors

Motivation: " Motivation refers to the drives, urges, wishes, or desires which initiate the sequence of events known as "behavior." (Bayton, 1958, p. 282). Humans are complex and it takes a great deal to understand what makes them do things. Perreau (n.d.) states that how motivation and needs are related because the consumer would always want to satisfy a pressing need. Maslow (1943) states that needs are hierarchical and the lower needs are to be satisfied before the higher level needs becomes

a concern. Figure eight shows the different levels of needs and how they are placed in a hierarchy.

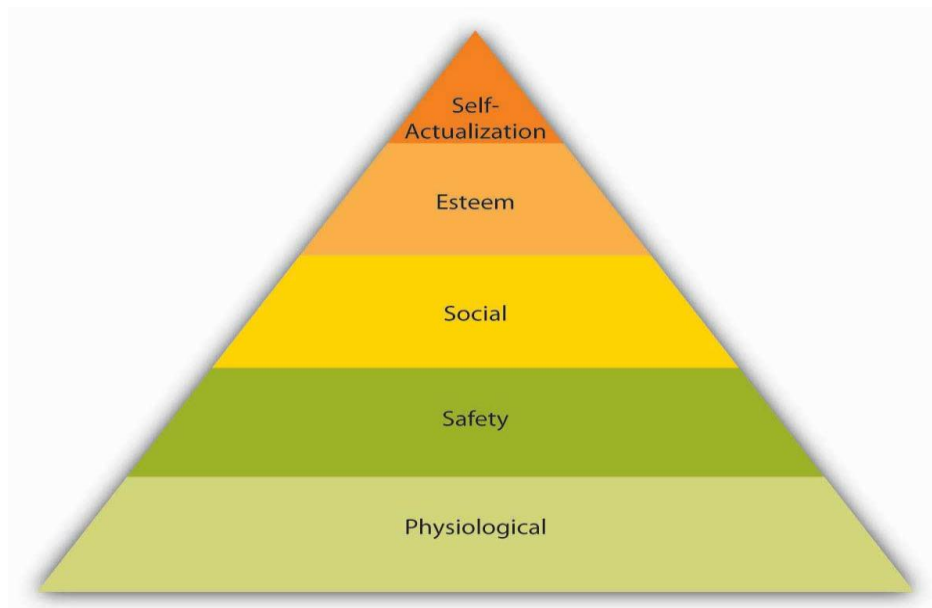


Figure 8: Maslow's Hierarchy of Needs Pyramid illustrating the 5 levels of human need. (new.edu)

Therefore, companies need to constantly create a brand image, that continuously reinforces in the consumers mind the need for the product that they develop a purchase motivation.

Perception: "The perceptions consumers have of a business and its products or service have a dramatic effect on buying behavior." (Mack, n.d.). As more information that the consumers have about a product influences the perception that they have or form over time. With the internet, there is more and more information out there for consumers and the positive or negative information that they get about a brand can affect their purchasing behavior. Businesses need to be able to influence the buying behavior of customers by making available more information about the product as there are substitutes out there that the customers can choose from But the company should be cautious about bombarding the customers with too much information as the risk is customers tuning out. (Mack, n.d.)

Learning: Learning according to the merriam-webster dictionary, is "the activity or process of gaining knowledge or skill by studying, practicing, being taught, or experiencing something." Experiences influence the ways that customers shop because they learn and are constantly gaining knowledge about products and they want the best value possible. In the case of a fitness person, for example they buy a kitchen appliance that was meant for making juices and they bought it because the revolutions per minute (RPM), with the knowledge that the lower the RPM the better the machine is at extracting juices from fruits. With information readily available on the internet and previous owners of products leaving reviews about products, it is easier for customers to make informed decisions on what they want.

### 3.4 Ethical Consumerism

"Ethical consumerism is the broad label for companies providing products that appeal to people's best selves." (Irwin, 2015). Ethical consumers buy products from "good companies" and do not from "bad" companies. When I say "good" companies, I mean companies that manage and run themselves ethically, integrating ethics in their structure, management, communication, and how they are transparent with their "stakeholders". The so called "bad" companies are the types that will involve themselves in unethical behaviors ranging from bribery to inability to check on compliance efforts. Devinney, Auger, and Eckhardt (2011) explain ethical consumers as "shoppers who base purchasing decisions on whether a product's social and ethical positioning—for example, its environmental impact or the labor practices used to manufacture it—aligns with their values." Although in recent times the ethical consumerism movement is losing traction even though people tend to or want to do the right things by buying products that are ethically produced " This pessimistic stance stems primarily from the lower sales of ethical brands." (Irwin, 2015). According to Devinney et al (2011) even when the companies produce these ethical product, "they are invariably met with indifference by all but a selected group of consumers."

There are four types of ethical buying ("Ethical Consumer", n.d.)

- **Positive Buying:** This means favoring particular ethical products, such as energy saving products. In this case the consumer is buying a product based on the

knowledge that the product has been made as ethically as possible meeting his satisfaction.

- **Negative Purchasing:** Can be said to be buying of products or services that does not fit into category of products that you like or approve of the way they are made or function such as heaters that run on gas for maybe the more efficient ones

- **Company-Based Purchasing:** Can be said to be buying or not buying from a company or avoiding their goods and services. For example, a company that does not meet the carbon emission standards or manufactures products in factories that treat workers badly.

- **Fully-Screened Approach:** Is when the consumer looks to buy a product or service that is manufactured ethically or has suppliers that are and they avoid those that are not.

### 3.5 Stakeholder Theory

From the company stand point, looking at how they run their organization can be a way to understand why they make or do not make energy efficient products. We can look at this from a stakeholder theory perspective.

According to the BusinessDictionary.com, a stakeholder is "a person, group or organization that has interests or concern in an organization and can affect or be affected by the organization's actions, objectives and policies". The ultimate business of any company is to make profit. They create products and services that, in turn, create value for their customers. But the idea of the stakeholder theory goes beyond that as "Stakeholder theory is an idea about how business really works" (Freeman, 2009). Furthermore, "for any business to be successful it has to create value for customers, suppliers, employees, communities and financiers, shareholders, banks and other people with the money". According to the author of the theory, R. Edward Freeman, it is impossible to look at any of these stakeholders in isolation as their interests have to go together. This theory emphasizes the idea that the job of a manager or entrepreneur is to figure out how the stakeholders mentioned above go in the same direction. These groups are very important to each other for a business to be successful. A

company will go into decline if it is out of sync with its customers. If they do not know what the customers want, how their product or service meets the needs of the consumer or if the consumer is ready for such products or service in the first place. A company could be in a decline also if they manage their suppliers in a way that the suppliers do not make them better (Freeman, 2009).

"Stakeholder management requires, as its key attributes, simultaneous attention to the legitimate interests of all appropriate stakeholders, both in the establishment of organizational structures and general policies and in case-by-case decision making." (DONALDSON & PRESTON, 1995, p.67). This theory does not state that everyone that is identified is a stakeholder and that they should equally be involved in the decision making processes of the company. below in figures nine and 10 highlight the conventional input-output perspective and the stakeholder concept.

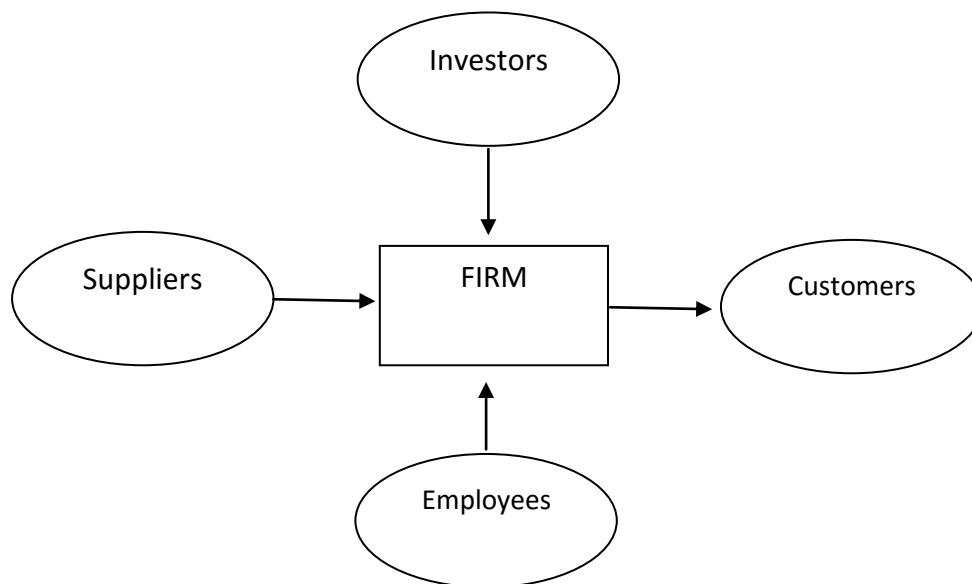


Figure 9: Input-Output Model (DONALDSON & PRESTON, 1995)

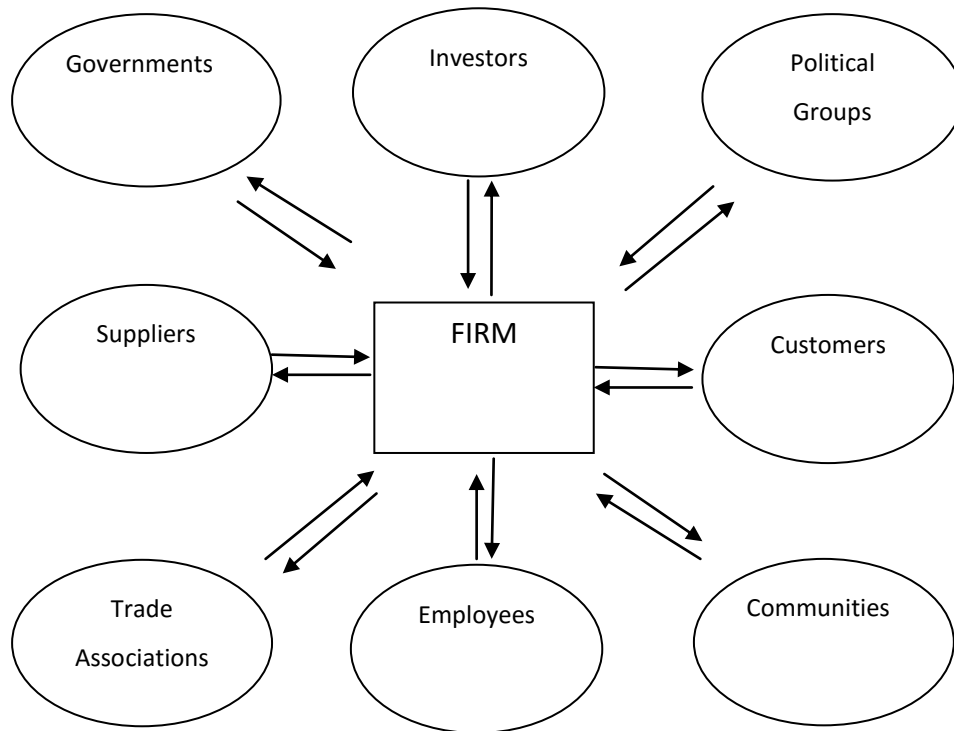


Figure 10: Stakeholder Model (DONALDSON & PRESTON, 1995)

" Every company exists in a network of relationships with social factors that affect and are affected by the company's efforts to achieve its objectives." Johnson-Cramer, M. (2008). In figure nine the inputs come basically from the investors (financiers), employees, and suppliers all aimed at the firm transforming it into benefits for the consumers (outputs). In contrast, the stakeholder model in figure 10 would be interpreted as "all persons or groups with legitimate interests participating in an enterprise do so to obtain benefits and that there is no prima facie priority of one set of interests and benefits over the other".

The stakeholder theory in regard to energy efficiency looks at how the companies perform or operate. This is by looking at their products, how much they spend on research and developing new technologies that will be more energy efficient, how

they create value for their consumers, and how they choose suppliers, how they meet carbon emission standards and regulations from the various government entities. For instance with one of the companies that I chose Haier, they "have attracted the world's leading suppliers to join our product platform through our open supply chain, amongst which, our platform was also designed to facilitate frequent interaction with consumers through online and offline channels". Profitability as a company comes with aligning interests with that of stakeholders. Their business strategy is developed along the lines that " Consumers will prefer environmental-friendly and high end home appliances, driving the ongoing consumption upgrade for home appliance industry". There is a principal agent relationship with the Chinese government where "The Chinese Government is also introducing incentive policies to encourage manufacturing enterprises to invest in upgrading production technology, promoting industry upgrade for home appliance industry".

I also research the annual report of Electrolux AB, in order to see the relationship stakeholder theory has on the company.

*"Electrolux endeavors to be a responsible, open and honest societal partner. As a signatory of the UN Global Compact, Electrolux is committed to promoting the ten principles covering human rights, labor standards, environment and anti-corruption along its value chain. As part of the company's responsible sourcing initiatives, Electrolux carried out 361 supplier audits in 2014." (Electrolux)*

This statement by the company establishes their commitment to their stakeholders and with this being said, there can be situations where conflicts arise as a result of differences or conflict of interests between stakeholders.

### 3.5.1 Stakeholder Conflict

There are various reasons why there could be conflicts and when people or groups of people come together it is inevitable to avoid conflicts. Stakeholder theory is about finding that point where the interests of the various stakeholders intersect. As a manager it is very important to understand how the different stakeholders interact with one another in the value making process. Stakeholders are living, breathing hu-

man beings and it is very important to understand that they are actual people. Stakeholder theory basically sees the human side to doing business and at this point ethics comes into play because ethics and business go a long together. Business cannot be done in isolation, consumers cannot be seen as just buyers of products, neither can it be that business is conducted just to make shareholders money. Finding the crossroads between interests between customers, suppliers, communities and shareholders, this is what creates value. Like in every situation where groups of people come together there is always conflict of interest but at the core their interests should align. This translates to having products that customers want, which in effect should translate back to the relationship with the suppliers, and the products or services should have a positive impact on the community or the customer should be pleased with the product, the employees should be happy working by transferring their knowledge and skills into producing the goods or services. Even though the ultimate aim is to make money for the company shareholders, everybody that can impact the value creation process needs to be happy performing their roles and management needs to see how the interests of the groups of people going the same direction. "Value creation works because we are able to take the needs of customers that might conflict with the community and figure out how to turn those into a profitable enterprise" (Freeman, 2009). For instance, there is a drought in California, and there is a real and pressing need to conserve water, companies manufacture products that consume less water. So is by looking at the intersection of the various interests by looking at issues that they do not normally look at, that is where the value creation opportunities really are.

In the city of California the stakeholders for both companies Haier and Electrolux are:

- Owners or shareholders whose interests include knowing how much income the company make.
- Managers that get paid salary.
- Workers that want increased wages and also job security.
- Customers that want quality goods and services at affordable prices.
- Suppliers who want the company to continue business with them by buying their products.
- Lenders who always want to get their money back, in time and all of it.

- The community where the companies operate, and employ residents

### 3.5.2 Stakeholders vs. Shareholders

The stakeholder vs. shareholder theory can be fully understood by taking a look at two companies, the way they operate and what type of theory they practice. I took a look at two major home appliance companies AB Electrolux and Haier. They are both global market leaders and have a very strong presence in the state of California.

It has been the school of thoughts that the primary aim or objective of any company is to make money for its shareholders. Shareholders can only make money if the company produces value to its customers. But the only way that this can happen is if all the stakeholders interests are aligned in the same direction. Therefore it would be counterproductive if stakeholders and shareholders are understood in isolation.

Therefore "a manager's duty is to balance the shareholders' financial interests against the interests of other stakeholders such as employees, customers and the local community, even if it reduces shareholder returns." (Smith,2003).

### 3.6 Blue Ocean Strategy

With the knowledge of how consumers think available to companies, this impacts their strategy and business model and "In blue oceans, demand is created rather than fought over. There is ample opportunity for growth that is both profitable and rapid." (Kim & Mauborgne, 2004). In recent times with the markets becoming increasingly saturated with different products, the home appliance, building materials and other products are becoming similar in the way they look and perform that people no longer have that brand loyalty but would base their purchase solely on price. There are different washing machines for instance that are similar in specification and design that the consumer looks at the price as a last deciding factor of whether to buy or not. In order for companies to survive, they are creating new products and services that create a new value for the consumers that would also help them position the company in the blue ocean where there is no competition. Kim and Mauborgne (2004) further stated that "Blue ocean strategy, is about doing business

where there is no competitor. " In the case of creating energy efficient and smart products, companies are looking for ways to create value for their users in a blue ocean where products are increasingly getting smarter and this is the yardstick for value creation.

## 4. Company profiles

### 4.1 Electrolux

"In North America, our operations were negatively impacted by the major transition required to meet new energy standards affecting refrigeration and freezers" (Electrolux, n.d). There are regulations that are set by policy makers that ensures that companies meet certain standards. And according to the company, "In North America, several new products were introduced. When developing new products, our focus is not only on design and features but also on consumers' requirements in relation to energy and water efficiency".

Electrolux was the industry leader according to Dow Jones Sustainability Index.

*"Sustainability is one of four prioritized areas in product development. At least one-third of the product development spend is environmentally related. Electrolux offers a Green Range of the most efficient products to meet the increasing demand for energy and cost-efficient appliances. In 2014, the Green Range represented 13% of products sold and 25% of gross profit." (Electrolux, n.d)*

In 2015 Electrolux's target was to reduce energy consumption by 15% compared to 2011. They were able to achieve in 2014 an energy consumption reduction by 5.1% compared to 2013.

Product manufactured by Electrolux like any other contributes to CO2 emissions as can be seen in figure 11

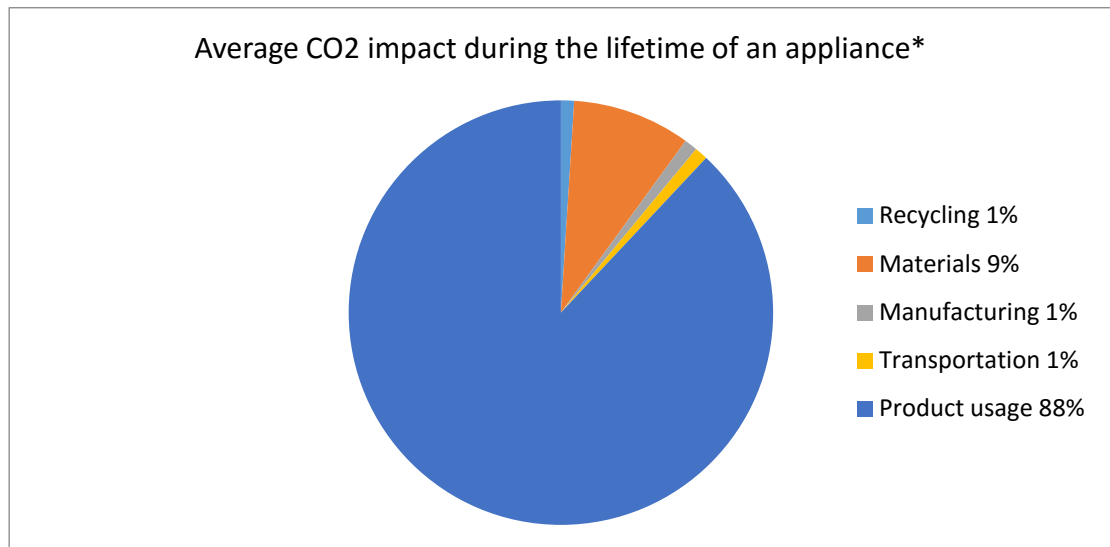


Figure 11: Average CO2 impact during the lifetime of an appliance (Image source: AB Electrolux)

\*Calculated as the average of eleven different appliances

"Improving energy and water efficiency across our product range and growing the market for efficient products are our highest priorities. This is why we have set the objective to be Number 1 or 2 in product efficiency based on main product categories, in main markets and consumer segments. Product efficiency is also a priority for investors." Furthermore, their company statement says "During 2014, through Green Range sales, we also saw an increase in consumer preferences for greener products and the Green Range represented 13% of products sold and 25% of gross profit."

## 4.2 Haier

Haier is a company that was founded in Qingdao China in 1984. They are a global company with operations also in the USA. They have won numerous awards and currently #1 appliance brand according to the Euromonitor who is a leader in consumer market strategy research. In the US they have a factory in Camden SC. They make different products ranging from washing machines, water heaters etc. The simplified business model of Haier group can be found in figure 10 below.

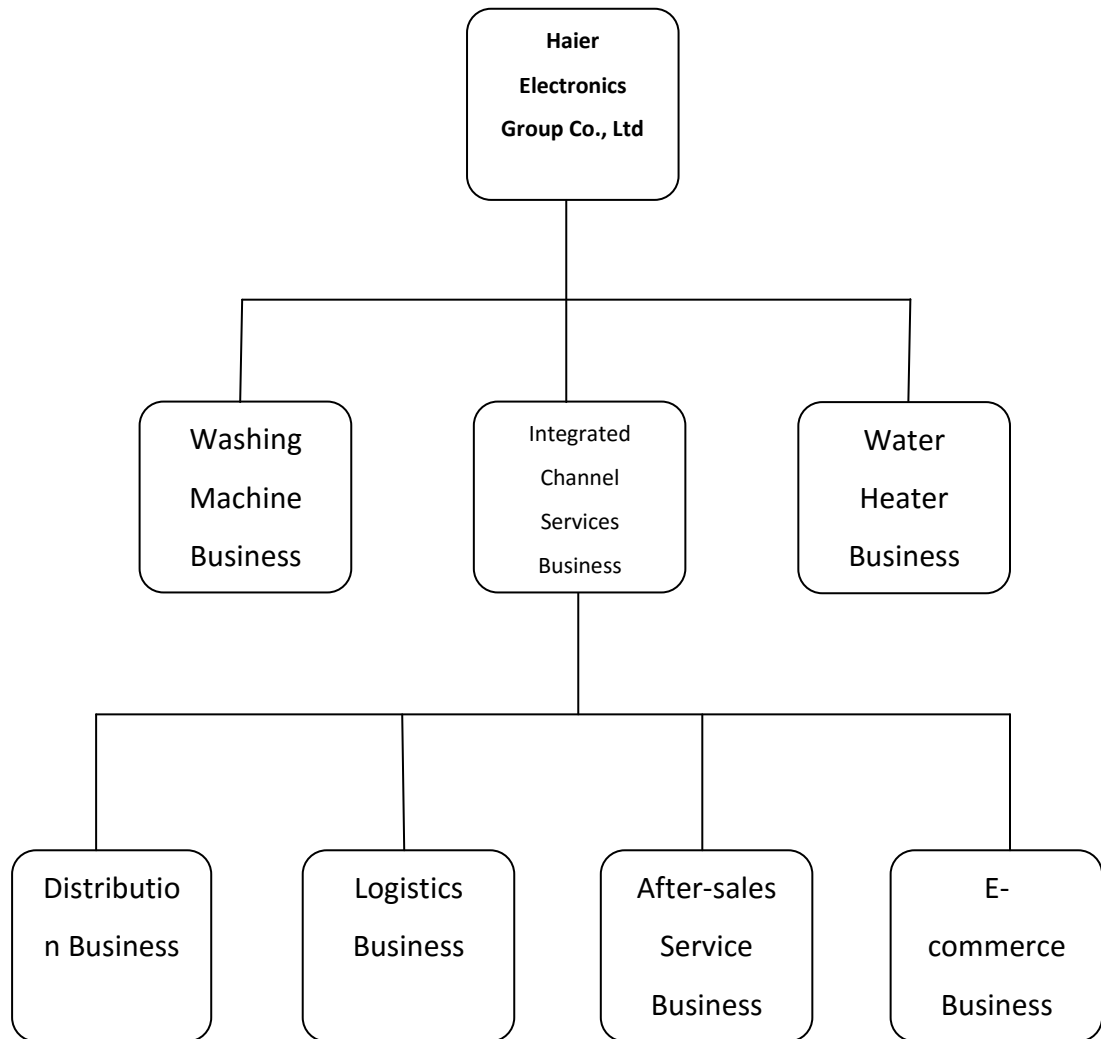


Figure 12: Simplified Business Structure (Haier)

"Haier concerns the interests of all stakeholders including employees, users, and stockholders" (Haier, n.d.). According to the statement on their website about the company's culture, they try to create a win-win model which is having employees that "two spirits" entrepreneurial and innovative so as to create value for the users, and in turn they create value for the company and the stockholders respectively. The entrepreneurial spirit of the employee is needed to enable them think independently so they are not the type that is managed but become the CEO on their own. The innovative spirit helps in creating value and the creation of new values comes from the creation of new users.

"At Haier, the company's management structure pivots around ZZJYTs (zi zhu jing yin

g ti, which in English means independent operation units)." (Liu, 2013). The model is responsible for inspiring the entrepreneurial spirit. In Haier, the company gives the employee autonomy to react to changes in the market and the freedom to decide income based on the value created for the users.

The company is particularly conscious about the fact that we are in the internet age and that this gives the customers the advantage of knowing everything about the company and on the contrary almost impossible to know everything about all its customers.

Haier in all their statements give the impression that they practice the stakeholder theory by acknowledging the "stakeholders" in their business.

## 5. Data analyses

With the use of statistical inference, a conclusion will be drawn about the entire population of the residents of California using random sampling. The questionnaire was distributed online to the respondents chosen in order to determine what drives the residents of California to adopt energy efficient technology (the parameter). In order to determine this, the questionnaires were sent to 84 citizens. Table five is a breakdown of the number of the respondents.

Table 4: Total number of the respondents.

	Number	Percentage
Male	40	47.62%
Female	44	52.38%
Total	84	100%

The analysis of the survey is as follows:

### 5.1 Frequency Table

**Is your attic well insulated?**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	21	25,0	25,3	25,3
	No	28	33,3	33,7	59,0
	Not sure	34	40,5	41,0	100,0
	Total	83	98,8	100,0	
Missing	900,00	1	1,2		
Total		84	100,0		

The table above shows a descriptive distribution generated by the quantitative method used. When asked how many had their attic insulated, 25% of the total respondents had insulated attics, 33.3% did not have their attic insulated, while 40.5% were not sure if they had insulated their attic or not.

**Someone else in my house would object**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	1	1,2	100,0	100,0
Missing	System	83	98,8		
Total		84	100,0		

When asked if someone else in the house would object to their attic being insulated, this question was answered by only one person saying yes there would be objection to installing insulation in the attic.

**I could afford it, but do not want to spend the money**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	6	7,1	100,0	100,0
Missing	System	78	92,9		
Total		84	100,0		

In the table above, 7.1% said yes which means that there are some of the respondents that could afford to install insulation in their attic but do not want to spend the money.

**I am too busy**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	4	4,8	100,0	100,0
Missing	System	80	95,2		
Total		84	100,0		

In the table above, I am too busy, there are respondents that are too busy and cannot be bother to install insulation in their attic. They amount to 4.8% of the respondents.

**It is too much effort**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	12	14,3	100,0	100,0
Missing	System	72	85,7		
Total		84	100,0		

14.3% of the respondents felt it is too much effort, thus they do not have insulation in their attic.

**I do not know how**

		Frequency	Percent
Missing	System	84	100,0

**I cannot afford it**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	17	20,2	100,0	100,0
Missing	System	67	79,8		
Total		84	100,0		

20.2% of the respondents say they are unable to afford insulation in their attic.

**Is your home furnace a high energy-efficiency model?**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	23	27,4	28,0	28,0
	No	24	28,6	29,3	57,3
	Not sure	34	40,5	41,5	98,8
	1210,00	1	1,2	1,2	100,0
	Total	82	97,6	100,0	
Missing	902,00	2	2,4		
Total		84	100,0		

Here, 27.4% of the respondents said they have an energy efficient furnace for heating the house, 28.6% said no and 40.5% said they are not sure if their furnace is energy efficient or not.

**Someone else in my house would object**

		Frequency	Percent
Missing	System	84	100,0

**I could afford it, but do not want to spend the money**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	6	7,1	100,0	100,0
Missing	System	78	92,9		
Total		84	100,0		

Six people from the respondents said they could afford it but did not want to spend the money for the upgrade.

**I am too busy**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	3	3,6	100,0	100,0
Missing	System	81	96,4		
Total		84	100,0		

**It is too much effort**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	6	7,1	100,0	100,0
Missing	System	78	92,9		
Total		84	100,0		

**I do not know how**

		Frequency	Percent
Missing	System	84	100,0

**I cannot afford it**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	20	23,8	100,0	100,0
Missing	System	64	76,2		
Total		84	100,0		

23.8% of the respondents said they cannot afford an energy efficient furnace to heat up their homes.

**Is your home air conditioner (AC) a high energy-efficiency model?**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	73	86,9	89,0	89,0
	No	4	4,8	4,9	93,9
	Not sure	5	6,0	6,1	100,0
	Total	82	97,6	100,0	
Missing	System	2	2,4		
Total		84	100,0		

When asked if they had an energy efficient air conditioner, 86.9% of the respondents answered yes, 4.8% said no, and 6% said they were not sure.

**Someone else in my house would object**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	2	2,4	100,0	100,0
Missing	System	82	97,6		
Total		84	100,0		

**I could afford it, but do not want to spend the money**

		Frequency	Percent
Missing	System	84	100,0

**I am too busy**

		Frequency	Percent
Missing	System	84	100,0

**It is too much effort**

		Frequency	Percent
Missing	System	84	100,0

**I do not know how**

		Frequency	Percent
Missing	System	84	100,0

**I cannot afford it**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	2	2,4	100,0	100,0
Missing	System	82	97,6		
Total		84	100,0		

**Is your water heater a high energy-efficiency model?**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1,00	66	78,6	80,5	80,5
	2,00	3	3,6	3,7	84,1
	3,00	13	15,5	15,9	100,0
Total		82	97,6	100,0	
Missing	System	2	2,4		
Total		84	100,0		

When asked if they had energy efficient water heaters, 78.6% of the respondents said yes, 3.6% said no and 15.5% said they were not sure.

**Someone else in my house would object**

		Frequency	Percent
Missing	System	84	100,0

**I could afford it, but do not want to spend the money**

		Frequency	Percent
Missing	System	84	100,0

**I am too busy**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	2	2,4	100,0	100,0
Missing	System	82	97,6		
Total		84	100,0		

**It is too much effort**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	1	1,2	100,0	100,0
Missing	System	83	98,8		
Total		84	100,0		

**I do not know how**

		Frequency	Percent
Missing	System	84	100,0

**I cannot afford it**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	1	1,2	100,0	100,0
Missing	System	83	98,8		
Total		84	100,0		

**Are light bulbs in your home high energy-efficiency compact fluorescent (CFLs)?**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	65	77,4	79,3	79,3
	No	8	9,5	9,8	89,0
	Not sure	9	10,7	11,0	100,0
	Total	82	97,6	100,0	
Missing	System	2	2,4		
Total		84	100,0		

77.4% of the respondents said they have high efficient compact fluorescent bulbs, 9.5% of them said not sure, and 10.7% of the respondents say they are not sure.

**Someone else in my house would object**

		Frequency	Percent
Missing	System	84	100,0

**I could afford it, but do not want to spend the money**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	1	1,2	100,0	100,0
Missing	System	83	98,8		
Total		84	100,0		

**I am too busy**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	2	2,4	100,0	100,0
Missing	System	82	97,6		
Total		84	100,0		

**It is too much effort**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	5	6,0	100,0	100,0
Missing	System	79	94,0		
Total		84	100,0		

**I do not know how**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	1	1,2	100,0	100,0
Missing	System	83	98,8		
Total		84	100,0		

**I cannot afford it**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	2	2,4	100,0	100,0
Missing	System	82	97,6		
Total		84	100,0		

**Do you turn off the lights when they are not needed?**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	81	96,4	98,8	98,8
	No	1	1,2	1,2	100,0
	Total	82	97,6	100,0	
Missing	System	2	2,4		
Total		84	100,0		

When asked about turning off the lights when not in use, 96.4% of the respondents responded yes.

**Too busy**

		Frequency	Percent
Missing	System	84	100,0

**Someone else in my house would object**

		Frequency	Percent
Missing	System	84	100,0

**Do not think it is important**

		Frequency	Percent
Missing	System	84	100,0

**It is too inconenient**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	1	1,2	100,0	100,0
Missing	System	83	98,8		
Total		84	100,0		

**It is too hard to remember**

		Frequency	Percent
Missing	System	84	100,0

**More comfortable with light on**

		Frequency	Percent
Missing	System	84	100,0

**Already doing as much as I can**

		Frequency	Percent
Missing	System	84	100,0

**Do you adjust your thermostat when not needed?**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	80	95,2	97,6	97,6
	No	2	2,4	2,4	100,0
	Total	82	97,6	100,0	
Missing	System	2	2,4		
Total		84	100,0		

When the respondents were asked if they adjusted their thermostat, 95.2% said yes, with 2.4% saying no.

**Too busy**

		Frequency	Percent
Missing	System	84	100,0

**Do not know how to set thermostat**

		Frequency	Percent
Missing	System	84	100,0

**Do not have a thermostat**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	1	1,2	100,0	100,0
Missing	System	83	98,8		
Total		84	100,0		

**It is too hard to remember**

		Frequency	Percent
Missing	System	84	100,0

**Do not think it is important**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	1	1,2	100,0	100,0
Missing	System	83	98,8		
Total		84	100,0		

**Cannot control my thermostat**

		Frequency	Percent
Missing	System	84	100,0

**Someone else in the home would object**

		Frequency	Percent
Missing	System	84	100,0

**Already doing this as much as I can**

		Frequency	Percent
Missing	System	84	100,0

**Prefer my home to be warmer**

		Frequency	Percent
Missing	System	84	100,0

**Do you adjust AC when needed**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	yes	80	95,2	97,6	97,6
	No	2	2,4	2,4	100,0
	Total	82	97,6	100,0	
Missing	System	2	2,4		
Total		84	100,0		

When asked if they adjusted their air conditioning when needed, 95.2% , with 2.4% saying no.

**Too busy**

		Frequency	Percent
Missing	System	84	100,0

**It is too inconvenient**

		Frequency	Percent
Missing	System	84	100,0

**Do not think it is important**

		Frequency	Percent
Missing	System	84	100,0

**Do not know how to set thermostat**

		Frequency	Percent
Missing	System	84	100,0

**Cannot set an exact temperature**

		Frequency	Percent
Missing	System	84	100,0

**Someone else in home would object**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	1	1,2	100,0	100,0
Missing	System	83	98,8		
Total		84	100,0		

**Already doing this as much as I can**

		Frequency	Percent
Missing	System	84	100,0

**Prefer my house to be cooler**

		Frequency	Percent
Missing	System	84	100,0

**Why do you turn off the light when not needed?****It saves me money**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	81	96,4	100,0	100,0
Missing	System	3	3,6		
Total		84	100,0		

96.4% of the respondents turn off their lights because they are convinced that saves them money.

**It helps reduce global warming**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	12	14,3	100,0	100,0
Missing	System	72	85,7		
Total		84	100,0		

14.3% of the respondents think turning off their lights when needed helps reduce global warming.

**It saves energy**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	81	96,4	100,0	100,0
Missing	System	3	3,6		
Total		84	100,0		

96.4% of the respondents see turning off their light when needed contributing to saving energy.

**Someone asked me to**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	1	1,2	100,0	100,0
Missing	System	83	98,8		
Total		84	100,0		

**It is the moral thing to**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	3	3,6	100,0	100,0
Missing	System	81	96,4		
Total		84	100,0		

**People I care about are doing it**

		Frequency	Percent
Missing	System	84	100,0

**It makes me feel good about myself**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	21	25,0	100,0	100,0
Missing	System	63	75,0		
Total		84	100,0		

25% of the respondents said that it makes them feel good about themselves.

**Other people approve when I do**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	9	10,7	100,0	100,0
Missing	System	75	89,3		
Total		84	100,0		

**Why do you adjust your thermostat when not needed?**

**It saves me money**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	81	96,4	100,0	100,0
Missing	System	3	3,6		
Total		84	100,0		

When asked why they adjust their thermostat, 96.4% of the respondents said it saves them money.

**It reduces global warming**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	13	15,5	100,0	100,0
Missing	System	71	84,5		
Total		84	100,0		

When asked what made them adjust their thermostat, 15.5% said it helps reduce global warming.

**It saves energy**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	80	95,2	100,0	100,0
Missing	System	4	4,8		
Total		84	100,0		

95.2% of the respondents think that it helps save energy.

**Someone asked me to**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	1	1,2	100,0	100,0
Missing	System	83	98,8		
Total		84	100,0		

**It is the moral thing to do**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	3	3,6	100,0	100,0
Missing	System	81	96,4		
Total		84	100,0		

**People I care about are doing it**

		Frequency	Percent
Missing	System	84	100,0

**It makes me feel good about myself**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	22	26,2	100,0	100,0
Missing	System	62	73,8		
Total		84	100,0		

26.2% of the respondents think that adjusting their thermostat feels like the right thing to do.

**Other people approve when I do it**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	8	9,5	100,0	100,0
Missing	System	76	90,5		
Total		84	100,0		

## 5.2 Company data analysis

Furthermore, the following information about the companies chosen were retrieved from their annual reports.

**EBITDA:** This is earning before interest, taxes and amortization. Essentially, EBITDA is a measure of a company's operating profitability.

**Research & Development:** According to investopedia, this is "Investigative activities that a business chooses to conduct with the intention of making a discovery that can either lead to the development of new products or procedures, or to improvement of existing products or procedures." This is a metric for evaluating how much has been invested into future technologies and products. In the cases of the companies chosen, R&D into energy efficient products.

**Sales:** This is money brought in by the company's through their activities and I have collected the revenue data from the companies to see how much sales they have made over the years.

**Liabilities:** This is how much a company owe, it is obligation that comes up during business operations. This is a very important metric as it can be used in ways which includes paying for expansions and finance operations.

**Equity:** This according to Investopedia is "the value of an asset less the value of all liabilities on that asset".

Taking a look at Table 6 shows which shows Electrolux's financial data from year 2002-2014, the descriptive statistic and the correlation analysis can be seen in table 7 and table 8 respectively.

Year	ElectroEBITDA	ElectroR&D	ElectroSALES	ElectroLIABILITIES	ElectroEQUITY
2014	8451.00	2872.00	112143.00	69220.00	16468.00
2013	7411.00	2739.00	109151.00	61693.00	14308.00
2012	8283.00	2128.00	109994.00	56328.00	19831.00
2011	6328.00	2043.00	101598.00	55740.00	20500.00
2010	9822.00	1993.00	106326.00	52908.00	20613.00
2009	8764.00	1991.00	109132.00	53855.00	18841.00
2008	4553.00	2092.00	104792.00	56938.00	16385.00
2007	7575.00	2017.00	104732.00	50049.00	16040.00
2006	7333.00	1832.00	103848.00	52855.00	13194.00
2005	10372.00	2187.00	129469.00	56670.00	25888.00
2004	9805.00	2052.00	120651.00	51460.00	23636.00
2003	10991.00	1628.00	124077.00	38178.00	27462.00
2002	12019.00	1797.00	133150.00	43605.00	27629.00

Table 6: Electrolux Financial data 2002-2014.

Descriptive Statistics			
	Mean	Std. Deviation	N
EBIT	8951.0667	2111.80074	15
R&D	2031.6667	385.60151	15
REVENUE	115290.6000	11543.19870	15
DEBT	53428.3333	7151.28334	15
EQUITY	21065.5333	5245.73390	15

Table 7: Descriptive statistic for Electrolux

Table 8: Correlation Electrolux

		Correlations				
		EBIT	RD	REVENUE	DEBT	EQUITY
EBIT	Pearson Correlation	1	-.471	.830**	-.523*	.815**
	Sig. (2-tailed)		.076	.000	.046	.000
	N	15	15	15	15	15
RD	Pearson Correlation	-.471	1	-.356	.824**	-.575*
	Sig. (2-tailed)	.076		.192	.000	.025
	N	15	15	15	15	15
REVENUE	Pearson Correlation	.830**	-.356	1	-.407	.878**
	Sig. (2-tailed)	.000	.192		.132	.000
	N	15	15	15	15	15
DEBT	Pearson Correlation	-.523*	.824**	-.407	1	-.588*
	Sig. (2-tailed)	.046	.000	.132		.021
	N	15	15	15	15	15
EQUITY	Pearson Correlation	.815**	-.575*	.878**	-.588*	1
	Sig. (2-tailed)	.000	.025	.000	.021	
	N	15	15	15	15	15

\*\* . Correlation is significant at the 0.01 level (2-tailed).

EBIT when correlated with itself gives us 1 which because when a variable is correlated with itself it will be perfectly correlated and that means they are exactly on a straight line.

The correlation between EBIT and R&D is -.471 (-47.1%) which tells us the strength of the linear relationship between the variables. This implies that the relationship between the variables EBIT and R&D is negative. In computing the data I chose a significance level of 0.01 and the significance level between the variables EBIT and R&D is .076. This is greater than my level of significance 0.01 which means that my correla-

tion is not statistically significant and that it just happened by chance. We can conclude that there is no evidence to suggest or ascertain that investment in research and development by Haier as lead to increase in their operating profit.

When the variable revenue was correlated against EBIT the result was .830 which is a positive relationship a significance level of .000 which makes it highly significant. This means that EBIT which is the operating profit makes up 83% of the total revenue that Haier makes at a confidence level of 99%. In other words, for instance Haier makes \$1000 in revenue, EBIT contributes \$830.

Correlation of the variable Debt against variable EBIT is -.523 which is a negative. The significance level .046\*\* which means the correlation is significant at the 0.05 level. The interpretation is that debt has no impact on the operating income of Haier.

The correlation of the variables equity and EBIT is .815 (81.5%) which means that there is a relationship between both variables. There is also a significance level of .000 which means for every \$1 spent on equity there is a 81.5% impact or increase in operating profit.

The correlation between the variables R&D and revenue is -.356 which is negative and indicates there is no relationship and a significance level of .192. This means there is no evidence to suggest or ascertain that increase in money assigned to R&D leads to increase in revenue.

The correlation between the variables R&D and debt is .824 (82.4%) which is a positive relationship with a significance level of .000 and indicates a 99% confidence level that debt increases with increase in R&D expenditure.

The correlation between the variables R&D and equity is -.575 which is negative and indicates there is no relationship between the variables and there is a significance level of .025.

The correlation between the variables revenue and equity is .0878 (8.78%) with a significance level of .000. This means there is a confidence level of 99% that equity contributes 8.78% to revenue.

The correlation between the variables revenue and debt is -.407 with a significance level of .132 which indicates not statistically significant.

The financial data for Haier from year 2006-2014 can be found in table 9 and the descriptive statistic and correlation data can be found in table 10 and table 11 respectively.

Table 9 : Haier Financial Data 2006-2014

Year	Haier EBIT	Haier R&D	Haier Revenue	Haier Debt	Haier Equity
2014	3165915	543684	67133962	15413234	12102040
2013	2637840	444605	62263162	13823499	8057664
2012	2244262	413714	55615047	12373038	5840228
2011	1848522	166725	50089857	10049804	4280853
2010	1444850	113465	35806672	6976989	2813638
2009	660394	81190	12877993	4464898	1572123
2008	202313	91923	11409480	3091681	1269095
2007	321956	60505	8549239	2724088	942124
2006	223496	87183	6901705	2574713	798567

Table 10: descriptive statistics Haier.

#### Descriptive Statistics

	Mean	Std. Deviation	N
EBIT	1292413.3000	1129423.16347	10
RD	211569.7000	181501.35436	10
REVENUE	31618825.3000	25205290.87861	10
DEBT	7390224.5000	5105823.35903	10
EQUITY	3878575.4000	3773307.87923	10

Table 11: Correlation data Haier.

		Correlations				
		EBIT	RD	REVENUE	DEBT	EQUITY
EBIT	Pearson Correlation	1	,917**	,989**	,995**	,952**
	Sig. (2-tailed)		.000	.000	.000	.000
	N	10	10	10	10	10
RD	Pearson Correlation	,917**	1	,888**	,933**	,957**
	Sig. (2-tailed)	.000		.001	.000	.000
	N	10	10	10	10	10
REVENUE	Pearson Correlation	,989**	,888**	1	,991**	,914**
	Sig. (2-tailed)	.000	.001		.000	.000
	N	10	10	10	10	10
DEBT	Pearson Correlation	,995**	,933**	,991**	1	,948**
	Sig. (2-tailed)	.000	.000	.000		.000
	N	10	10	10	10	10
EQUITY	Pearson Correlation	,952**	,957**	,914**	,948**	1
	Sig. (2-tailed)	.000	.000	.000	.000	
	N	10	10	10	10	10

\*\* . Correlation is significant at the 0.01 level (2-tailed).

For Haier, EBIT when correlated with itself gives us 1 which because when a variable is correlated with itself it will be perfectly correlated and that means they are exactly on a straight line.

The correlation between the variables EBIT and R&D is .917 (91.7%) with a significance level of .000 which means there is a relationship between both variables

meaning that for every investment in R&D, there is a 91.7% increase in operation profit with a 99% confidence level.

The correlation between the variables EBIT and revenue is .989 (98.9%) with a significance level of .000 which shows a relationship between both variables. This means that the operating profit or EBIT contributes 98.9% of revenue with a 99% confidence level.

The correlation between the variables EBIT and debt is .995 (99.5%) with a significance level of .000 which means there is a relationship between both variables which can show the company's profitability and ability to service its debt. In this case the company's debt is 99.5% of its operating profit at a confidence level of 99%.

The correlation between the variables EBIT and equity is .952 (95.2%) with a significance level of .000 which indicates a relationship between both variables. With equity contributing to operating profit to a tune of 95.2% with a confidence level of 99%.

The correlation between the variables R&D and revenue is .888 with a significance level of .001 which indicates a high level of relationship. This signifies that expenditure on R&D leads to an 88.8% increase in revenue with a confidence level of 98%.

The correlation between the variables R&D and debt is .933 with a significance level of .000 which is a high relationship. This is an indication that debt increases with expenditure on R&D or R&D is financed by debt with R&D a confidence level of 99%.

The correlation between the variables R&D and equity is .957 with a significance level of .000 indicating a relationship between both variables, indicating that R&D contributes to the Haier's equity with a confidence level of 99%.

The correlation between the variables revenue and debt is .991 with a significance level of .000 making the relationship between both variables with a confidence level of 99%.

The companies manufacture products because they know that consumers want to save money on bills.

## 6. Conclusion

When asked why they adjust their thermostats, 96.4% of the respondents said it saves them money and when asked what made them adjust their thermostat, 15.5% say it helps reduce global warming.

95.2% of the respondents think that it helps save energy while 96.4% of the respondents use their lights when needed because they feel and are convinced that their bills are reduced and there is savings from less consumption of energy.

According to the black box theory, there are stimuli responsible for the buying decisions, for instance product, price, place and promotion, which are the marketing stimuli. These are all tools that Haier and Electrolux use in selling their products. They make energy efficient products that have a competitive price range. For instance, when asked if the respondents had energy efficient air conditioning, 86.9% responded yes. This is a product category that is not capital intensive compared to an attic insulation, or insulated windows replacing all the windows in the house, or insulation to the wall that involves remodeling. There are non-central air conditioning units that will serve the purpose of cooling the house but not break the bank. In the product category of air conditioning units, if the consumer goes to the store to purchase the product, they can be fairly certain they are getting the right one because of the labels on the products stating they are energy efficient, and energy star certified, as opposed to having a contractor install insulation in the attic and they are not 100% certain if the insulation and process of installation will guarantee an energy efficient home by keeping the heat out and the cool air in.

Taking a look at the results of the survey questions, when asked about their homes and how energy efficient it was or if they had products that were energy efficient, the conclusion is that only a few really knew about how efficient their house was because they were not directly involved in building the house. They were not also so sure as to if their homes actually were, but when it came to the products like air conditioning, heating, bulbs etc, they were more aware about these because they were directly involved in the purchases of these items.

When they were asked about conservation of energy, the majority of them said they did that and when asked why they did that they mostly said it saved them money and energy with a few saying that it helped reduce global warming.

The companies that sell energy efficient products, Haier and Electrolux respectively, both invest heavily in R&D in making products because there is a demand for it. A demand based on the notion that consumers want to save money on energy bills. They market products that are energy efficient, with the energy efficiency star logo on them to let consumers know that the product saves money as a result of the technology used.

Consumers, on the other hand, want to save hard end money and reduce the amount of money they spend on their energy bills. Therefore if there are products that they are directly in charge of buying without the help of a professional home appliances, they will buy energy efficient ones, partly because there are also abundant products that are energy efficient as it is a growing trend.

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