



**IMPLEMENTATION OF RENEWABLE ENERGY CONCEPT IN  
THE AUTOMOTIVE INDUSTRY IN MALAYSIA  
AN EXPLORATORY STUDY**

**Zaid Ahmed Muhsen Alhayali**

**MASTER OF BUSINESS ADMINISTRATION**

**2013**



**Faculty of Technology Management and  
Technopreneurship**

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**ZAID AHMED MUHSEN ALHAYALI**

**A thesis submitted  
in fulfillment of the requirements for the degree of Master of Business  
Administration (MBA)**

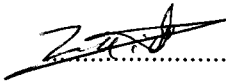
**Faculty of Technology Management and Technopreneurship**

**UNIVERSITI TEKNIKAL MALAYSIA MELAKA**

**2013**

## DECLARATION

I declare that this thesis entitle “Implementation of Renewable Energy in the Automotive Industry in Malaysia an Exploratory Study” is the result of my own reaesrch except as cited in the references. The thesis has not been accepted for any degree and is not concurrently submitted in candidature of any other degree.

Signature : .....  
Name : ...Zaid Ahmed Muhsen Alhayali...  
Date : ...01\ 03\ 2013....

## **DEDICATION**

To those who Always Encourage me to be Better, to my Family I Dedicate this Work

## ACKNOWLEDGEMENT

Alhamdulillah, praise be to Allah, the Most Compassionate, the Most Merciful, for it is with His permission I am able to complete this thesis. It would not have been possible to write My Master thesis without the help and encouragement of the kind people around me.

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## ABSTRACT

With the growing concern about the consequences of climate change, and the increase in the rate of natural disasters around the world, it becomes very important for the world to witness a great shift in the use of energy. Many solutions appeared to prevent the environment from climate change. These solutions varies from developing new mechanisms and technologies to generate less CO<sub>2</sub> from fossil fuel such as energy efficiency concept in automotive, cement and petrochemical industries. Shifting from oil to gas in some industries like electricity generation and renewable energy which is the main focus of this research. In Malaysia, renewable energy considers as a fifth source of energy. Different types of renewable energy have been used in various sectors. The aim of this research is to understand the level of renewable energy in Malaysia, the rules and regulations that have helped green technology to flourish in Malaysia, and finally how the automotive industry responses to the changes in the business environment to meet the challenge of climate change. Four research questions have developed to achieve the aim of this research. In designing this research two methods have implemented; focused literature review and multiple case studies. to understand the beginning of the awareness towards climate change as well as the current situation of the renewable energy in Malaysia, literature review is a crucial factor to achieve the research aim. Multiple case studies will be followed in this research. To have in depth understanding of renewable energy in Malaysia, case study is important. The findings of this research suggest that Green technology in Malaysia still in the developing stage. The investment in green products is too high which needs to consider in relation with market size. Malaysian government is playing the major role in supporting green concept. in terms of the public awareness, more actions need to be taken to encourage more consumers to consider green products\ services and their first choice.

# CHAPTER ONE

## 1.0 Introduction

In this chapter the researcher will discuss four sections. **Section 1.1** the point of departure, discusses the issues behind conducting this research. **Section 1.2** research aim and research questions, highlights the purpose of this research and the issues the researcher wants to understand. **Section 1.3** scope of the research, outlines the path and the development of this research. **Section 1.4** research structure outlines the journey of this research. Lastly, conclusion summarizes the work in this chapter.

During the last three decades the world witnessed a revolutionary effort in conducting researches, developing technologies, and forming strategies and government policies to mitigate climate change; the focus was what have been done to deal with the global warming. Some people might think that this is the beginning use of green energy or energy produces less CO<sub>2</sub>. In fact, the use of clean energy was very clear during the various stages of history. For example, renewable energy is the oldest form of energy in the history, the first form of energy that mankind was able to control. Using sunlight for heating and lighting, wind to travel in the sea, all are examples of renewable energy usage in a simple form.

With the emerging of industry revolution, there was a need for new types of energy that can sustain in the long term with reasonable price. From that point, renewable energy had replaced by Fossil energy coal, oil, and later natural gas. This was the beginning of "gasoline era", which causes pollution and difficult relationship (politically and economically) between countries controlling the petrol reserves, and those who need energy to grow.

Oil becomes the dominant energy in all aspects of life. There is no doubt that oil considers as one of the most influential factors that contributed to the industry revolution and later technology revolution. As it's the nature of the world everything has its advantages and disadvantages. The rising of climate change, gave signals to start searching for new source of energy that can be relatively cheap, easy to obtain, sustainable and most importantly environmental friendly.

Countries, researchers, entrepreneurs, government, multinational companies as well as small companies, NGOs and Environmental groups, all have been searching for the best way to save the globe, what kind of energy can be used to help save our planet?, what are the mechanisms we should implement to reduce the effect of global warming?. These are some of the questions that environmentalists are trying to answer.

Many solutions have been introduced to prevent the environment from climate change. These solutions varies from developing new mechanisms and technologies to generate less CO<sub>2</sub> from fossil fuel, good example to consider here is the implementation of energy efficiency concept in automotive, cement and petrochemical industries. Shifting from oil to gas in some industries like electricity generation and finally, renewable energy which is the main focus of this research. **Chapter 2** will present in further details “renewable energy” in terms of meaning, types, usage and benefits.

## **1.1 Point of Departure**

With the growing concern about the consequences of climate change, and the increase in the rate of natural disasters around the world, it becomes very important for the world to witness a great shift in the use of energy. The growth of CO<sub>2</sub> emissions in the Middle East and North Africa was the third-largest in the world in 1990-2004 and more than 3 times faster than the world's average (World Bank, 2007). In order to achieve a shift in the mindset of people, more actions need to be taken to transfer the researches effort into practice, as the challenge of climate change increasing day after day.

As this research trying to understand the concept of renewable energy, there are two (2) main reasons behind such desire: firstly, is the background of the researcher from Middle East plays a major role in choosing this topic. Middle East region and specifically Iraq have been suffering from harsh climate change. Many researches and studies have predicted that Middle East countries will become hotter and drier in the coming years.

It is worth mentioning that out of the 22 Arab countries, 15 are among the world's most-water stressed countries with water per capita of less than 1,000 m<sup>3</sup> (UNDP, 2002). Moreover, almost

all of the Arab countries lie in semi-arid and arid regions that are highly vulnerable to climate change (Elasha, 2010). Drought, reduction in clean water, decrease in agricultural lands, and dust storm are among the result of climate change in the region.

As a result, any change in the frequency or severity of extreme climate events could have profound impacts on nature and society (Aguilar, 2005). The researcher believes that it's very important for the region to focus more on renewable energy even though the price of fossil fuel are very cheap in the region as most of the countries there, are oil producers, in that sense climate change puts more pressure on the governments in the region to peruse the choice of green technology.

Secondly, the researcher was very lucky in choosing Malaysia to further his study. Malaysia is a country rich with a lot of renewable energy sources. **Table 1.1** shows the renewable energy resources and its value in Malaysian Ringgit. The researcher was aware about the importance of renewable energy in the development of Malaysia and its role to achieve the vision of 2020, thus the researcher wishes to understand the atmosphere in the business of renewable energy in Malaysia.

**Table 1.1:** Renewable Energy Resource Potential in Malaysia

Renewable Energy Resource	Energy Value in RM Million(Annual)
Forest Residues	984
Palm Oil Biomass	379
Solar Thermal	023
Mill Residues	836
Hydro	506
Solar pv	378
Municipal Waste	190
Rice Husk	77
Landfill Gas	4

Source: (Yusoff, & Kardooni, 2012)

It is believed that it will be a good opportunity to study renewable energy in Malaysia to understand and transfer what he will learn after conducting the study to Middle East in the future, Malaysia and most of Middle East countries are sharing the same values.

Having discussed the major drivers behind this topic, the researcher wishes to study renewable energy as one of the best choices to provide clean energy and the cost can be less than other choices or technologies currently in the field of green technology.

## 1.2 Research Aim and Research Questions

The use of renewable energy has gained a lot of attention in the recent years. In Malaysia, renewable energy considers as a fifth source of energy. Different types of renewable energy have been used in various sectors. For example the use of solar panel can be seen in building to generate electricity, it can be used also for desalination. Wind energy used to generate electricity, other renewable energy forum such as Biofuel which is replacing the traditional fuel. the researcher believes that the time has come to examine renewable energy in transport sector in Malaysia (more details will be provided in Chapter Two), thus **The aim of this research is to understand the level of renewable energy in Malaysia, the rules and regulations that have helped green technology to flourish in Malaysia, and finally how the automotive industry responds to the changes in the business environment to meet the challenge of climate change.** To achieve the aim of this research, there are four (4) questions for this research:

**RQ1.** Who are the players in implementing renewable energy?

**RQ2.** How the Malaysian government react towards climate change?

**RQ3.** How transport sector in Malaysia is dealing with the issue of climate change?

**RQ4.** How could be described the opportunities in transport sector the private companies can take to deal with the issue of global warming?

## 1.3 Scope of the Research

The following discussion highlights the scope of this research. The flow of this research can be pursued in four stages. The first stage starts with the idea of understanding what the world has done to address the issue of global warming. It's important to have a clear picture about how the

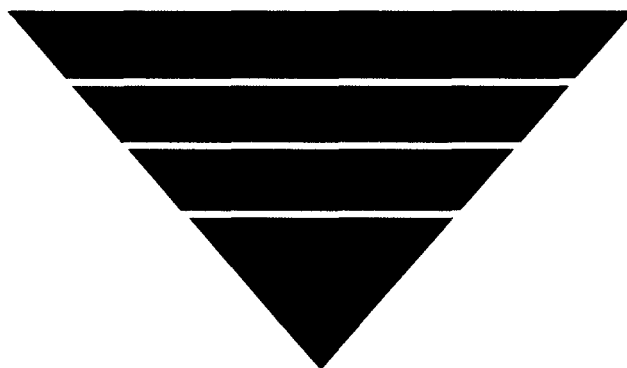
international community, multinational companies, and entrepreneurs look towards global warming.

To have a better understanding of this topic and to answer the research questions. It is important to study the history of climate change, and the actions that have been taken to tackle this problem by the international community. From that point, the researcher moved to the next stage which is the proposed solutions to solve climate change. Many solutions have been developed to reduce the effect of climate change.

Realizing that it is important to study and understand these solutions to determine which one of it to be focused. At the end, the decision made to study green technology. Under green technology, there are different approaches such as: energy efficiency, Carbon capture and storage, recycling and renewable energy.

Stage three deals with the practice of renewable energy. The term renewable energy used to describe these types of energy which produce less or zero CO<sub>2</sub>. Studying renewable energy will be based on the drivers behind renewable energy, which are; private sector, government and society. The choice of these factors made according to the reading and literature the researcher has done to support each one of it.

The last stage which is the main focus of this researcher is transport sector. Having reviewed the renewable energy in terms of types, use and its benefit, the researcher found that the best way to study renewable energy is in transport sector in Malaysia. Not only in Malaysia in many countries, transport sector considered as one of the major producer of CO<sub>2</sub>.



**Figure 1.1:** Scope of the Research



## 1.4 Structure of the Study

**Chapter 1** the introduction, provides a clear picture about the main idea behind choosing this topic. Establishing research aim, research questions, drawing the scope of the research all will be highlighted to form a solid foundation for next chapters.

**Chapter 2** literature review aims to review and highlight related studies and researches in the following topics: consumption of energy in Malaysia, impact of climate change in Malaysia, growth of transport sector in Malaysia, definition of renewable energy, types of renewable energy, the use of renewable energy, private sector and renewable energy in Malaysia, related government rules and policies in Malaysia, and lastly the relation between green technology and green consumers.

**Chapter 3** “research methodology” outlines methods and techniques to be used in conducting this research, the discussion based on the following headlines; the nature of research, research strategies, research design, and method of research, lastly retrospective review for the study to summarize what have done in this chapter.

**Chapter 4** results and findings, this chapter analyzes the data that have collected from: case study 1, and 2, in the desire of gaining more understanding of Malaysian car manufacturing sector, more specifically the business of green car (hybrid\ electric car) in Malaysia. Descriptive analysis will be used based on the patterns which have developed from the theoretical framework.

**Chapter 5** conclusion and recommendations, this chapter draws the following: discuss the findings, and its relation to the research questions, conclusion, recommendations, limitations and future research, finally, personal reflection.

## 1.5 Summary

This chapter begins with the reasons of choosing this topic. The topic of green technology and fighting climate change is the main interest of the researcher, thus, there are two reasons behind choosing this topic. As the researcher hails from Middle East specifically from Iraq which is a country highly exposed to the climate change, with the fact that of being in Malaysia, one of the

most developing countries that started to realize the importance of green technology to save the environment and bring wealth for the nation, both reasons have made the choice of this research. **The aim of this research is to understand the level of renewable energy in Malaysia, the rules and regulations that have helped green technology to flourish in Malaysia, and finally who the automotive industry responses to the changes in the business environment to meet the challenge of climate change.** Four (4) research questions have set to achieve the aim of this research. Scope of the research outlines to borders and stages of this research four stages highlighted started from climate change stage, green technology stage, renewable energy stage and finally, renewable energy in transport sector.

# CHAPTER TWO

## 2.0 Introduction

Five (5) issues to be highlighted in this chapter, meaning of climate change and key events organized by the international community related to climate change. Exploring renewable energy in terms of types, usage, and benefits. An overview of the Malaysian transport sector following be factor effecting renewable energy concept in Malaysia will be discussed as well. A theoretical framework to be constructed summarizing the finding from previous researches, studies, and reports, which are the main source of data in this chapter.

Climate change has become the topic of the day around the globe, many researchers, scientific institutions, and international organizations, involved to find ways to tackle this issue. From this point the researcher aware that there are different and many definitions trying to explain climate change, thus, this research will use the definition that are used by United Nations and its related organizations.

To this regard, Climate change in Intergovernmental Panel on Climate Change (IPCC) define climate change as a change in the state of the climate that can be identified (e.g. using statistical tests) by changes in the mean and/or the variability of its properties, and that persists for an extended period, typically decades or longer. It refers to any change in climate over time, whether due to natural variability or as a result of human activity (2011).

This definition differs from the one used in the United Nations Framework Convention on Climate Change (UNFCCC), where climate change refers to a change of climate that is attributed directly or indirectly to human activity that alters the composition of the global atmosphere and that is in addition to natural climate variability observed over comparable time periods. (2011).

Both definitions agreed that the cause of climate change relies largely on human activities that result in producing Carbon dioxide. Using fossil fuel to generate energy, deforestation, Methane emissions from various industrial activities, and finally using artificial chemicals, all have contributed to the climate change.

From this point, the last two decades have witnessed a great effort in the national and international levels to mitigate climate change. It is worth noting that the international community and specifically the United Nations and its related agencies have contributed in a large scale to initiate programs and provide policies. **Table 2.1** highlights the beginning concern of climate change.

It is important to mention that the researcher was aware of that there are many conferences and programs in the national, regional, and international level dealing with impact of climate change. Choosing to focus on international level is to spotlight the major effort of the international community, and the consensus countries have reached over the issue of climate change.

**Table 2.1:** Key Events of Climate Change Conferences and Related Policies

Year	Events	Description	References
1972	Stockholm Conference, Stockholm, Sweden	<ul style="list-style-type: none"> <li>• The conference held under the theme of United Nations Conference on the Human Environment and formation of the United Nations Environment Program (UNEP)</li> <li>• Addressed the need for a common outlook and for common principles to inspire and guide the peoples of the world in the preservation and enhancement of the human environment.</li> </ul>	United Nations Environment Program (UNEP); Galizzi, (2005)
1979	First World Climate Conference Geneva, Switzerland	<ul style="list-style-type: none"> <li>• Considered as the first major global recognition of man's role in climate change.</li> <li>• Focused on how climate change might affect human beings.</li> <li>• For the first time the participants agreed to identify carbon dioxide as a cause for global warming, which included in the Declaration of the World Climate Conference.</li> <li>• It was one of the first major international meetings on climate change that led to the establishment of:               <ul style="list-style-type: none"> <li>- World Climate Program (WCP).</li> <li>- World Climate Research Program (WCRP).</li> </ul> </li> </ul>	Koo, (2011), kumar, (2010)

		<ul style="list-style-type: none"> <li>- Intergovernmental Panel on Climate Change (IPCC).</li> </ul>	
35	Convention for the Protection of the Ozone Layer, Vienna, Austria	<ul style="list-style-type: none"> <li>• Framework agreement in which States agreed to: <ul style="list-style-type: none"> <li>- Cooperate in relevant research and scientific assessments of the ozone problem.</li> <li>- Exchange information about the ozone problem.</li> <li>- Adopt measures to prevent activities that harm the ozone layer.</li> </ul> </li> <li>• It is important to mention that the obligations are general and contain no specific limits on chemicals that deplete the ozone layer.</li> </ul>	UNEP, (2001); Weiss, (2009)
37	Montreal Protocol on Substances that Deplete the Ozone Layer, Montreal, Canada	<ul style="list-style-type: none"> <li>• Montreal Protocol is a landmark international agreement designed to protect the stratospheric ozone layer.</li> <li>• The treaty was originally signed in 1987 and substantially amended in 1990 and 1992.</li> <li>• Montreal Protocol stipulates that the production and consumption of compounds that deplete ozone in the stratosphere--chlorofluorocarbons (CFCs), halons, carbon tetrachloride, and methyl chloroform--are to be phased out by 2000.</li> </ul>	UNEP(2000); European Communities, (2007),
8	UN Forms Panel on Climate Change (IPCC)	<ul style="list-style-type: none"> <li>• The United Nations Environment Program and the World Meteorological Organization establish the Intergovernmental Panel on Climate Change (IPCC) to: <ul style="list-style-type: none"> <li>- Assess available scientific data and the possible broader impacts of climate change.</li> <li>- Propose a global response.</li> </ul> </li> </ul>	Treut, el at., (2007); Daniel Bodansky
0	Second world Climate Conference Geneva,	<ul style="list-style-type: none"> <li>• The main task of the conference was to review: <ul style="list-style-type: none"> <li>- The WCP set up by the first conference.</li> <li>- The IPCC first assessment report which had completed for</li> </ul> </li> </ul>	kumar, (2010); IUCC, (1993)

Switzerland	<p>this conference.</p> <ul style="list-style-type: none"> <li>• The conference led to the establishment of: <ul style="list-style-type: none"> <li>- The United Nations Framework Convention on Climate Change (UNFCCC).</li> <li>- The Global Climate Observing System (GCOS) a system for climate and climate-related observations.</li> </ul> </li> </ul>	
2 Earth Summit in Rio de Janeiro, Brazil	<ul style="list-style-type: none"> <li>• Systematic scrutiny of patterns of production, particularly the production of toxic components, such as lead in gasoline, or poisonous waste including radioactive chemicals.</li> <li>• <b>Developing new type of energy to replace fossil fuels, fossil fuels which have linked to climate change.</b></li> <li>• <b>Highlighting the importance of public transport to reduce CO2 emissions that result from different type of vehicles.</b></li> <li>• Much concern should be given to the water scarcity around the globe.</li> <li>• Very important breakthrough has achieved and opened for signature in the conference it was: <ul style="list-style-type: none"> <li>- The Framework Convention on Climate Change (UNFCCC).</li> </ul> </li> </ul>	UN Conference on Environment and Development (1992); United Nations Conference on Sustainable Development, (2012)
Framework Convention on Climate Change (UNFCCC), Rio de Janeiro, Brazil	<ul style="list-style-type: none"> <li>• International environmental treaty negotiated at Earth Summit, in Rio de Janeiro.</li> <li>• The aim was limiting the greenhouse gas (GHG) in the atmosphere, that resulting in damaging the environment.</li> <li>• No binding limits and no enforcement mechanisms on greenhouse gas emissions for countries in this treaty.</li> <li>• A framework for negotiating specific international treaties (called protocols) has established which can set binding limits on greenhouse gas.</li> <li>• The establishment of the Conferences of the Parties (COP) to meet annually in conferences to negotiate and agree about how to tackle the issue of climate change, the beginning was from</li> </ul>	NRG4SD (2011); Conservation International, (2010)

		<p>1995 in Germany.</p> <ul style="list-style-type: none"> <li>• One of the biggest achievements to consider is the Kyoto Protocol (1997).</li> </ul>	
15	Conference of the Parties (COP 1) Berlin, Germany	<ul style="list-style-type: none"> <li>• The first UNFCCC Conference of the Parties.</li> <li>• First time to issue the concerns about the adequacy of countries' the abilities to meet commitments under the Body for Scientific and Technological Advice.</li> </ul>	John et al.,(2006); UNFCCC (1995)
16	Conference of the Parties (COP 2) Geneva, Switzerland	<ul style="list-style-type: none"> <li>• The Ministerial Declaration was noted (but not adopted) which: <ul style="list-style-type: none"> <li>- Accepted the scientific findings on climate change proffered by the Intergovernmental Panel on Climate Change (IPCC) in its second assessment (1995).</li> <li>- Rejected uniform "harmonized policies" in favor of flexibility.</li> <li>- Called for legally binding mid-term targets.</li> </ul> </li> </ul>	John et al.,(2006); Conferences of the Parties (COP): a short history
17	Conference of the Parties (COP 3) Kyoto, Japan	<ul style="list-style-type: none"> <li>• Adopted the Kyoto Protocol to the United Nations Framework Convention on Climate Change, which outlined the greenhouse gas emissions reduction obligation.</li> <li>• The larger burden falls on developed countries, because, the treaty argues, these nations share more responsibility for the current level of pollution.</li> <li>• The treaty will enter into force in 2005.</li> <li>• The conference established what came to be known as Kyoto mechanisms such as emissions trading, clean development mechanism and joint implementation.</li> <li>• Most industrialized countries and some central European economies in transition agreed to legally binding reductions in greenhouse gas emissions of an average of 6 to 8% below 1990 levels between the years 2008–2012, defined as the first emissions budget period.</li> </ul>	John et al.,(2006); Conferences of the Parties (COP): a short history
18	Conference of	<ul style="list-style-type: none"> <li>• Adopting a 2-year "Plan of Action" to advance efforts and to</li> </ul>	John et

	the Parties (COP 4) Buenos Aires, Argentina	devise mechanisms for implementing the Kyoto Protocol, to be completed by 2000.	al,(2006); Conferences of the Parties (COP): a short history
9	Conference of the Parties (COP 5) Bonn, Germany	<ul style="list-style-type: none"> <li>• It was primarily a technical meeting, and did not reach major conclusions.</li> </ul>	John et al,(2006); Conferences of the Parties (COP): a short history
0	Conference of the Parties (COP 6) (Part 1), The Hague, Netherlands	<ul style="list-style-type: none"> <li>• The discussions evolved rapidly into a high-level negotiation over the major political issues.</li> <li>• This included major controversy over the United States proposal to allow credit for carbon "sinks" in forests and agricultural lands that would satisfy a major proportion of the U.S. emissions reductions.</li> <li>• Disagreements over consequences for non-compliance by countries that did not meet their emission reduction targets.</li> <li>• Difficulties in how developing countries could obtain financial assistance to deal with adverse effects of climate change and meet their obligations.</li> <li>• In the final hours of COP 6, the EU countries as a whole, led by Denmark and Germany, rejected the compromise positions, and the talks in The Hague collapsed.</li> <li>• COP 6, suspended without agreement, with the expectation that negotiations would later resume.</li> <li>• It was later announced that the COP 6 meetings (termed "COP 6 bis") would be resumed in Bonn, Germany, in the second half of July.</li> </ul>	John et al,(2006); Conferences of the Parties (COP): a short history
1	Conference of the Parties (COP 6) (Part 2) - Bonn,	<p>The main decisions of COP 6 include:</p> <ul style="list-style-type: none"> <li>• Flexible Mechanisms "flexibility" mechanisms which including emissions trading; joint implementation; and the Clean</li> </ul>	John et al,(2006); Conferences of the Parties