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Exploring the intention of the South West of Western Australian residents to purchase solar panels using the Theory of Planned Behaviour approach

Greg Murray

Thesis submitted in partial fulfilment of the requirements for the award of
Bachelor of Business (Marketing) Honours
School of Marketing, Tourism and Leisure
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Co-Supervisor: Dr Alicia Stanway

Edith Cowan University

Submitted October, 2012

Declaration

I certify that this thesis does not, to the best of my knowledge and belief:

(i) Incorporate without acknowledgment any material previously submitted for a degree or diploma in any institution of higher education;

(ii) Contain any material previously published or written by another person except where due reference is made in the text; or

(iii) Contain any defamatory material

Signed.....

Dated.....

Acknowledgements

It must be known to anyone who is considering participating in the Honours program that it is very demanding. It is important to know that without the help and extensive support by friends, family and most of all your supervisor(s), it would be very difficult to complete the Honours program, let alone achieving your desired goal.

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Abstract

Global warming is a concern for many people around the world (Lorenzoni, Pidgeon, 2006; Searle & Gow, 2010). The negative effect of climate change is increasingly apparent (Belluscio, 2010; Dunlop, 2010; Hirabayashi, Kanae, Emori, Oki & Kimoto, 2008; Oelemans, 1994). In response to growing public concern, governments are implementing legislation and carbon initiatives to decrease the impact of climate change (Crane, 2010; D'Souza, 2005). Although these government actions are important to implement environmental preservation among industries, this study focuses on the intentions of purchasing behaviour of the individual homeowner of the South West region of Western Australia. More specifically, the purchasing behaviour towards solar panels as they are the most commercially accessible form of renewable technology for homeowners. Increasing the intention of homeowners to purchase solar panels may subsequently reduce the impact of global warming.

This study used Theory of Planned Behaviour (TPB) to test three factors (behavioural beliefs, normative beliefs and control beliefs) that may influence the intention to purchase solar panels. A quantitative approach was used in this study, surveying 342 respondents. The results indicated that intention to purchase solar panels can be predicted by behavioural, normative and control beliefs, however, normative beliefs was the strongest predictor.

In light of the findings attained by this study, marketing firms may use the results to add additional dimensions to future campaigns. This may have an effect of increasing the uptake of solar panels by homeowners in the South West region, which could reduce carbon emissions that are a side-effect of producing electricity. Reducing carbon emissions in the South West region could be the start of reducing the global impact of climate change.

CHAPTER ONE: INTRODUCTION

1.1 Introduction

The temperature of the planet is increasing and scientific evidence supports this claim (Anderegg, Prall, Harold & Schneider, 2010). Extensive research indicates that this global issue is the result of human activity which is linked to transportation, industrial activity and the production of electricity (Kerr, 2007). These industries are the main contributors of Greenhouse Gases (GHG) which are emitted into the atmosphere (The Ultimate Climate Change FQA, 2012). The challenges global warming presents must be met with a solution that neutralises the negative effects which are evident today.

Through implementing renewable energy, GHGs may be reduced, which could stop global warming increasing (Kerr, 2007; Patrinos & Bradley, 2009; Seinfeld, 2011). To date, many countries around the world have invested billions of dollars in renewable energy in an effort to reduce GHGs (Aanesen, Heck & Pinner, 2012; Australian Government, 2012; Clean Energy Council, 2012). One facet of the renewable energy industry is the use of solar panels (photovoltaic cells). This technology can be implemented in large scale projects and can also be purchased by homeowners for private use, thus reducing their demand for power from the energy grid.

Currently, it is indicated by Brown (2009), Heaney (2006), Reddy and Painuly (2004) that the homeowners' financial status is the main contributing factor towards purchasing solar panels. In Australia the government has used financial incentives as a means of increasing the purchasing of solar panels by homeowners. This study will investigate if there are other factors influencing the purchase intention of solar panels for homeowners in the South West region of Western Australia, using the Theory of Planned Behaviour.

The Theory of Planned Behaviour (TPB) has been selected as the framework used in this study to help identify what influences an individual's intention to purchase solar panels. TPB was formulated by Icek Ajzen (1975) and it measures three different factors, behavioural, normative and control beliefs, which may influence intention towards a certain behaviour (Ajzen, 2005). TPB has been used in many studies to determine the level in which these factors influence intention (Ajzen & Driver, 1992; Bell, Conner & Norman, 2002; Caron, Godin, Lambert & Otis, 2004; Ozaki, 2011; Rhodes, 2011; Tegova, 2010; Van Ryn & Vinokur, 1990). Additionally, the study will determine which factor has the strongest bearing on the homeowners' intention to purchase solar panels.

1.2 Purpose of the Study

The purpose of this study is to identify what factors have the greatest impact on intention to purchase solar panels in the residential South West region of Western Australia. The importance of these findings is related to the current government action regarding the reduction of financial assistance for homeowners to purchase solar panels (Energy Matters, 2012). Previous research shows that an individual's financial status is the main factor influencing intention (Brown, 2009; Sadorsky, 2011). If this is accurate, then the solar panel industry may see a decline in sales, which is reminiscent of the solar hot water system market (Brown, 2009; Heaney, 2006; Morton, 2012; Reddy & Painuly, 2004). Furthermore, it is believed that current marketing strategies that advertise government subsidies are detrimental to the industry and a different approach is needed (M. Maughan, Sales and Business Development Department, Solar 1, personal communication, October 18, 2012). Therefore, the importance of identifying factors other than financial may be crucial for the survival of the solar panel industry.

1.3 Research Questions

Using a quantitative approach, this research will explore the consumer influences towards their intention to purchase solar panels by surveying residents in the South West region of Western Australia. This leads to the overarching research question:

Research Question: "What are the factors influencing intention to purchase residential solar panels in the South West region of Western Australia?"

Subsequently, there are several hypotheses guiding this research process:

- H¹ There is a positive correlation between behavioural beliefs and intention to purchase.
- H² There is a positive correlation between normative beliefs and intention to purchase.
- H³ Normative beliefs will be the strongest predictor of intention to purchase solar panels.
- H⁴ There is a negative correlation between control beliefs and intention to purchase.
- H⁵ Intention to purchase solar panels will be predicted by behavioural, normative and control beliefs.

1.4 Definitions of Terms

The study involved concepts that the reader may not be familiar with. To access the definitions of terms please refer to Appendix A.

1.5 Structure of Thesis

Chapter One will commence with an introduction to the study. This will be followed by identifying a current global problem; present the research question; discuss the subsequent hypotheses guiding the research project and introduce the theoretical framework that this study has implemented.

Chapter Two will discuss the literature on climate change, renewable energy and solar panels. These are the main issues that are discussed in this chapter. The literature leads to the introduction of the hypotheses that will be tested to identify if they support previous research acknowledged in this study. Finally, the theoretical framework of this study will be introduced and described in detail as it is a pivotal part of this study.

Chapter Three introduces the method used to answer the research question including a description of the participants, details of the instrument used and the procedure in which the investigation was conducted. Finally, the ethics that was attained by the ECU Research Ethics Committee and how the researcher abided by the regulations of the ethics is described.

Chapter Four presents the findings of the quantitative study. The use of correlation, regression and exploratory factor analyses were used to gain an extensive insight into the results that were extracted from the data collected.

Chapter Five discusses the literature that has been introduced in Chapter Two and how it relates to the results conducted by this study. The results from Chapter Four are also discussed which leads to supporting the hypotheses tested in this study. Subsequently, the researcher discusses how the results affect solar panel uptake in the South West region. The need to expand on this study by other researchers and the limitation of the study are examined. Finally, recommendations by the researcher are presented.

CHAPTER TWO: LITERATURE REVIEW AND THEORETICAL FRAMEWORK

2.1 Introduction

Chapter Two will provide a review of the relevant literature including an overview of climate change, the market of renewable energy, and the advantages of solar panels from federal and state government perspectives. Subsequently, the theoretical framework section introduces Ajzen's (1991) Theory of Planned Behaviour and will expand upon how it will help answer the overarching research question.

2.2 Climate Change

Global consensus within the majority of reputable scientific organisations in the world agrees that climate change is occurring (Anderegg, Prall, Harold & Schneider, 2010). Evidence from ice core samples from Antarctica and Greenland shows that there is a relationship between carbon dioxide and climate change (Belluscio, 2010; Shakun et al., 2012). Today, ice shelves and valley glaciers are documented as melting at record levels (Belluscio, 2010; Dunlop, 2010; Hanna, et al., 2008; Kerr, 2007; Oelemons, 1994). An increase in droughts, floods, melting of the ice caps, permafrosts, glaciers and raising sea levels are also occurring (Belluscio, 2010; Dunlop, 2010; Hirabayashi, Kanae, Emori, Oki & Kimoto, 2008; Oelemans, 1994).

According to Seinfeld (2011), global warming is a result of human activity. He concludes that solar insolation has remained the same over the last 60 years; the Sun's 11 year sunspot cycles have no long term influence on the Earth's climate therefore; with substantial analysis of scientific evidence, no natural climate factor is responsible for the increase of global temperature (Seinfeld, 2011). A report released by the Intergovernmental Panel of Climate Change (IPCC) declared that human activity is mainly to blame for global

warming (Kerr, 2007). These findings support the argument that carbon dioxide along with other Greenhouse Gases (GHG), including methane and nitrous oxide produced by the burning of fossil fuels is responsible for global warming (Moore, 2008; Seinfeld, 2011).

The global temperature has experienced periods of cooling but overall, it is increasing (Nicholls, 2010). In fact, the warmest 16 recorded years have happened in the last 20 years (Prothero, 2012). Furthermore, the IPCC (2007) confirms that the global temperature has risen by 0.8 of a degree celsius over the last 150 years and most of the increase has occurred in the last 30 years. Carbon dioxide produced by humans is the cause of global warming and the damaging effects are related (Moore, 2008; Seinfeld, 2011; Spencer, 2007).

Despite the evidence available there are people who do not believe that global warming is a real occurrence. Critics in September, 2009 said that the planet was cooling but, in fact, six months later, 2010 was recorded as the warmest year on record (Nicholls, 2010).

The planet's temperature cannot rise any more than two degrees otherwise the environmental consequences could become problematic (Kerr, 2007). To limit the chances of this happening, Patinos and Bradley (2009) believe that carbon dioxide must be contained between 450 to 500 million parts per million (PPM) molecules of dry air. In 2011, carbon dioxide had been measured at 390 PPM but considering current energy consumption and population trends, it is predicted that PPM will reach between 900 to 1000 by 2100 (Seinfeld, 2011). Governments around the world must address this challenge to avoid the uncertain future that may lay ahead (Kerr, 2007). To address the challenge, the main contributing causes must be identified.

The main contributors toward producing GHGs on a global scale are: energy production, industrial activity and transportation 24.9 per cent, 14.7 per

cent and 14.3 per cent respectively (The Ultimate Climate Change FQA, 2012). Currently, through the use of coal, oil and gas to produce electricity, the World Resource Institute confirms that these sources of energy are responsible for creating 61.4 per cent of global GHGs emissions (Sadorsky, 2011). Australia also uses fossil fuels as a primary source to create electricity.

Today non-renewable energy is the main source of energy in Australia. The use of black coal (52%), brown coal (23%) and gas (15%) are the primary materials to produce energy (Energy in Australia, 2012). Of these main sources of energy, gas is predicated to become the primary source to produce electricity in Australia (Energy in Australia, 2012). This expectation is due to greater cost efficiency of energy production and the low carbon emissions that it creates (Energy in Australia, 2012).

Non-renewable sources of energy cannot be used indefinitely as they are predicted to become depleted within 40 years (May, 2010; Trainer, 1997). According to Rubin (2009), resource depletion will increase oil prices, which will increase the cost of many items bought and used by the consumer. It is believed that when oil prices reach \$150 a barrel that will mark the beginning of the end of globalisation as a result of transportation costs becoming too high to justify shipping expenses (Rubin, 2009). Consequently, communities may need to become self-sufficient through localised production (Box, Wakeman & Smith, 2005). These issues are related to energy security and the implications that are involved.

Energy security and climate change are two current issues that affect many countries around the world (Gradziuk & Wyciszkievicz, 2009). Finding the right balance between the two issues is difficult as one is concerned with the constant supply of oil and gas, the other reducing GHGs (Dolata-Kreutzkamp, 2008; Gradziuk & Wyciszkievicz, 2009; May, 2010; Rodgers-Hayden, Hatton & Lorenzoni, 2011). The threat of a terrorist attack or monopoly pricing power of

the main oil producing countries is a constant concern (Sadorsky, 2011). To increase energy security especially for countries that import oil and gas, a heightened effort towards international co-operations must be achieved (May, 2010). Conversely, competition may arise between countries concerning new oil fields (Dolata-Kreutzkamp, 2008). Such a situation is developing between Canada and the countries of the European Union (EU) who are racing to claim oil fields in the Arctic and northern parts of North America (Dolata-Kreutzkamp, 2008). Some countries such as England will diversify its energy sources and as a result may increase its nuclear capacity to heighten its energy security by reducing its dependence on gas (Rodgers-Hayden, Hatton & Lorenzoni, 2011). Until countries can break their dependence on oil as a main source of power, energy security will continue to be a driver for renewable energy (Sadorsky, 2011).

2.3 Renewable Energy

Renewable energy is a growing market that is comprised of different energy producing sources (Alekkett, Hook, Jakobsson, Lardelli, Snowden & Soderbergh, 2010; Sadorsky, 2011). These systems consist of wind, solar, hydro, geothermal, bio-mass and tidal, of which governments are creating on a large scale to produce renewable energy for mass consumption. It is believed that the production of renewable energy will be greater than global energy needs in the future (Alekkett, Hook, Jakobsson, Lardelli, Snowden & Soderbergh, 2010). To achieve this, renewable energy technology must overcome current challenges.

The adoption of renewable energy currently faces four separate issues. Firstly, the projects are expensive to build and are constructed vast distances from the final usage point (Vaitheeswaran, 2003). Secondly, the cost of producing electricity is high and therefore the consumer must make the choice to pay a premium price (Schilling & Esmundo, 2010). Thirdly, technical advancement must improve to become a main source of energy (Energy in Australia, 2012). Finally, renewable energy policies set by the government must

have the right mix of strategies for the continuing development of renewable energy (Dunlop, 2010; Shi, Wang & Yang, 2010; Weyant, 2011). Solving these issues may further increase the implementation of renewable energy in countries around the world.

Currently, there are many countries around the world that are using different forms of renewable energy. Governments and businesses are funding large scale projects within their own countries with the United States (24.7 %), Germany (11.7%) and Spain (7.8%) making the greatest contribution towards the use of renewable energy (Geothermal Energy HQ, 2012). However, their efforts are not enough to prevent further global warming. Other countries must do more to divert the bleak predictions of the future which is consistent with climate change.

Renewable energy is becoming the fastest growing market in the energy sector on the planet (Sadorsky, 2011). The International Energy Agency (IEA) believes that between 2007 and 2030 the global demand for renewable energy will grow an estimated 7.3 per cent each year (Alekklett, Hook, Jakobsson, Lardelli, Snowden & Soderbergh, 2010). This is higher than the planet's increasing demand for energy that is estimated to grow 1.5 per cent each year (Alekklett, Hook, Jakobsson, Lardelli, Snowden & Soderbergh, 2010). Today, renewable energy accounts for 19 per cent of the total global energy use (REN21, 2010). According to the IEA (2009), this is an increase of 6.4 per cent from 2007 when renewable energy accounted for 12.6 per cent of global energy contribution. In 2009, the United States, renowned as one of the world's highest energy consuming countries, was powered by eight per cent of renewable energy (Bilgin, 2009). Hydropower contributed 35 per cent, wind power nine per cent, geothermal five per cent and solar one per cent (Bilgin, 2009). Australia is also following the global trend of increasing the use of renewable energy.

The Australian large scale renewable energy market was worth nine billion dollars in 2010 (Australian Government, 2012). The renewable energy sources made up five per cent of the Australian energy market in 2010 (Energy in Australia, 2012). The Australian renewable energy sector comprises wood and woodwaste, bagasse and hydroelectricity that accounted for 83 per cent of energy created (Energy in Australia, 2012). The remaining 17 per cent of renewable energy was produced from bioenergy (biogas and biofuels), wind and solar (Energy in Australia, 2012).

Renewable energy in Australia attributes five per cent of its total energy production (Energy in Australia, 2012). In the medium to long term plans for Australian energy, an increase in using different energy sources will be implemented (Energy in Australia, 2012). This will be guided by policies that are preparing the economy to become less carbon intensive and will be achieved by increasing the growth of the renewable energy sector, which will be led by wind power (Energy in Australia, 2012). The growth of the renewable energy industry in Australia is designed to reach the Federal Government's goal of producing 45 000 gigawatt hours of clean energy by 2020 (Energy in Australia, 2012).

2.4 Solar Panels

Solar panels are one facet of the renewable energy market. Since its creation by Charles Fritts in 1889 (Richards, 2004), solar technology has advanced substantially. It has recently had a boom that was the result of government investment and policy (Aanesen, Heck & Pinner, 2012). During this time investment from the private sector also increased as demand for the technology was high. The start of 2009 saw the market slow as the Global Financial Crisis reduced national governments' spending and cuts to subsidies followed (Aanesen, Heck & Pinner, 2012). Oversupply of the solar panel market incurred a 40 per cent drop in prices and these issues resulted in companies going bankrupt (Aanesen, Heck & Pinner, 2012). Today the solar panel market is experiencing a global recovery and substantial investments are predicted to

materialise (Aanesen, Heck & Pinner, 2012). As of 2011, the global installation of solar panels was 65 gigawatts (GW) (Aanesen, Heck & Pinner, 2012). In addition, Christen Lins, Executive Secretary of REN21 remarked that total investment in renewable energy increased by 17 per cent to a record US\$257 billion (Clean Energy Council, 2012). Aanesen, Heck and Pinner (2012) predict that by 2020, installation will reach 400 to 600 GW and underlying costs will drop by 10 per cent.

The high and low of the solar panel market's recent history are evident (Aanesen, Heck & Pinner, 2012). Innovation in technology, streamlining production, an increase of mass production, and creating sustainable relationships with suppliers are just a few things that need to be implemented to aid the solar panel industry in the future (Aanesen, Heck & Pinner, 2012). Also, it is believed that investment of over one trillion dollars US by major equity firms and private investors could fund solar panel companies over the next decade (Aanesen, Heck & Pinner, 2012). Investments and good practice of operations such as these affirm the potential that the solar power market has a sustainable future of growth.

2.4.1 Federal Government

The Australian Federal Government introduced a Carbon Tax on the 1st of July, 2012 (Australian Government, 2012). This tax enforces polluting industries to change their behaviour to reduce carbon emissions (Labatt & White, 2007; Mohen, Goldstein & Wang, 1991). The Carbon Tax applies to all polluting industries (agriculture, private and public transport are exempt) that create carbon dioxide (Daily Wire, 2011; Stafford, 2011). Polluting industries are taxed \$23 per tonne of carbon dioxide produced (Daily Wire, 2011; Stafford, 2011). The Federal Government hope that companies will become more energy efficient and substitute fossil fuels with renewable energy which will lead to a reduction of carbon dioxide produced (Stern, 2007; What is the Carbon Tax?, 2012). In addition to the Carbon Tax, in 2001 the Federal Government set a target to have

20 per cent of energy produced by renewable sources by 2020 (ESAA, 2012). Through the implementation of the Carbon Tax and the 20 per cent renewable energy target, it is clear that Australia is directing its energy production to become a low carbon emission economy (Energy in Australia, 2012; ESAA, 2012). These are a few government policies that may further increase solar panel uptake in the near future.

During 2001 to 2009, there were 86,000 solar panels installed in Australian homes producing 123 megawatts (MW) per year. In 2010, the installation of residential solar panels increased to 158,000 producing an extra 305 MW per year (Australian Government, 2012; Energy in Australia, 2012). Nine per cent of Australian homes have solar panels installed on their roofs (Clean Energy Council, 2012). Although installation seems high, solar electricity is the smallest contributor to renewable energy, producing only one per cent in Australia (Energy in Australia, 2012). Furthermore, Australia represents one per cent of the global use of solar panels (Brown, 2009). Notwithstanding, solar power is the fastest growing source of energy, which has increased its production at an average rate of 21 per cent over the last five years (Energy in Australia 2012).

2.4.2 Western Australian Government

The Western Australian Government provides subsidies for solar panels to its residents (Energy Matters, 2012b). The subsidy that the government provides hopes to encourage a greater adoption rate of solar panels amongst its residents. As a result, almost 83 000 homes have solar panels in the state of Western Australia (Clean Energy Council, 2012). The following Local Government Areas of the South West region were rated as two of the top 10 places in Western Australia with the highest uptake of solar panels: the shire of Harvey ranked fifth with 18.7 per cent and the shire of Busselton placed eighth with 15.7 per cent (Clean Energy Council, 2012). These numbers look promising for the solar panel industry but the continuation of the uptake of the technology

remains reliant on government subsidies (Clean Energy Council, 2012). Furthermore, it is believed that current marketing strategies that advertise around government subsidies are detrimental to the industry and a different approach is greatly needed (M. Maughan, Sales and Business Development Department, Solar 1, personal communication, October 18, 2012).

On the 31st of July, 2012, the subsidy was reduced to 33 per cent and Feed-in Tariffs suspended (Energy Matters, 2012a). Victoria, New South Wales, Tasmania and Queensland also reduced their subsidies and feed-in tariffs this year which has displayed a national trend reducing solar panel subsidies (Ferguson & Barrett, 2012; Walker, 2012). If the government abolish the solar panel subsidy the rate of solar adoption may fall, which is reflective of the solar hot water system industry when the Federal Government abolished the subsidy as of February this year (Morton, 2012). This study seeks to investigate that if subsidies are removed, are there any other factors that influence homeowners to purchase solar panels? To investigate what motivates individual homeowners to purchase solar panels, this study will apply the Theory of Planned Behaviour (TPB) as its theoretical framework.

2.5 Theory of Planned Behaviour

TPB may be used to explain factors which influence intention to purchase solar panels. TPB is defined as an “individual’s intention to perform a given behaviour” (Ajzen, 1991, p. 181). There are three main factors influencing one’s behaviour: behavioural beliefs (attitudes towards the behaviour), normative beliefs (social influence) and control beliefs (perceived behavioural control) (Ajzen, 2005). *Behavioural beliefs* reflect an individual’s belief that an action will lead to perceived outcome (Ajzen, 2005). *Normative beliefs* account for social pressure an individual feels (Ajzen, 2005). These pressures are strongest from the individual’s social group such as friends and family also known as referents (Ajzen, 2005). *Control beliefs* are the ability of the individual to take an action.

The stronger the individual believes that an action can be acted upon the greater the likelihood that action will be initiated (Ajzen, 2005) (Figure 1). It is proposed that together these beliefs influence the intention to purchase solar panels. To date, the TPB has not been applied in the context of solar panel uptake, which provides a unique opportunity for this research. The next few paragraphs will explain why TPB is used and discusses previous research that has successfully implemented the model which confirms its validity.

TPB (Ajzen, 1991) is an important model for this research. This is because the primary aim is to understand what factors influence the individual's intention. This will be applied towards the investigation as to why individuals decide whether or not to purchase solar panels. With this in mind, TPB will be used to help guide the selection process of questions that will be used for the quantitative investigation to identify the impact of the aforementioned factors.

TPB has been used to predict, with a high degree of accuracy, behavioural intentions. Coupled with perceived behavioural control, TPB is also able to predict whether or not a behavioural intention will translate into actual behaviour (Ajzen, 1991). Studies that have used TPB to predict behavioural intentions are: problem drinking (Rhodes, 2011), leisure activities (Ajzen & Driver, 1992), healthy eating (Bell, Conner & Norman, 2002), condom use (Caron, Godin, Lambert & Otis, 2004) and career choice (Tegova, 2010). Van Ryn and Vinokur (1990) have stated that not only is the TPB an effective tool to understand behaviour but it is also useful to change behaviour. These past experiences from the aforementioned studies validate the decision to use the TPB in the proposed research.

TPB has also been used in research regarding the adoption of a green electricity tariff in the United Kingdom (Ozaki, 2011). This is relevant to this study as the factors that deter individuals purchasing a green electricity tariff are similar to the factors solar panels encounter. The research done by Ozaki

(2011) has identified factors that may lead to adoption such as: personal relevance, an emotional connection and strong social norms must be present for an increased likelihood of adoption. Inconvenience and uncertainty of the quality of green energy are deterring factors that reduce the likelihood of adoption (Ozaki, 2011).

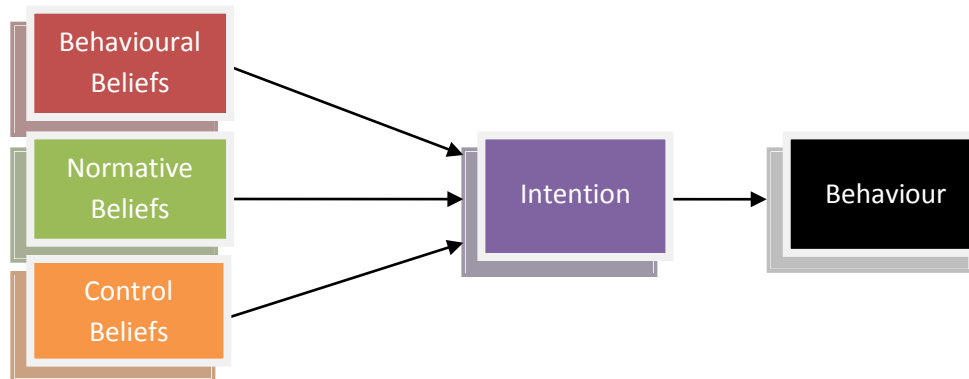


Figure 1: Theoretical model of TPB

2.5.1 Behavioural Beliefs

Behavioural beliefs reflect an individual's belief that an action will lead to perceived outcome (Ajzen, 2005). For example, "solar panels will reduce global warming"; or "solar panels will reduce my power bill". Environmentally conscious consumers are actively seeking products that have a limited impact on the environment (Sadorsky, 2011). They are mature aged people of developed societies who can afford premium prices and tend to be first adopters of renewable energy products (Grønhoj & Thøgersen's, 2009; Sadorsky, 2011). These individuals interpret this as a self-sacrificing behaviour that will increase their status within the respective social circle they belong to (Griskevicius, Tyber & Van den Bergh, 2010). This is known as pro-social behaviour (altruism) which increases their pro-social reputation (egoistic) (Griskevicius, Tyber & Van den Bergh, 2010; Semmann, Krambeck & Milinski, 2005).

The example described above is of a type of individual performing an action which will lead to a perceived outcome; in this case increasing one's status within their social circle. The stronger an individual believes their action will lead to a perceived outcome, the greater the likelihood they will perform that action (Ajzen, 2005).

Accordingly, hypothesis 1 proposes that:

- H¹ There is a positive correlation between behavioural beliefs and intention to purchase solar panels.

2.5.2 Normative Beliefs

Normative beliefs are concerned with the probability that an individual's social group will approve of particular behaviour (Ajzen, 1991). For example, "my friends have solar panels, so should I". This is also known as social norming which has an influence on how individuals behave (Donovan & Henley, 2010). The attitudes of friends, family, and workmates influence the individual's decision making process whether to purchase the technology or not (Donovan & Henley, 2010). At an individual level, the majority of people have environmentally friendly intentions but translation into behaviour is done by the minority (Crane, 2010). When a group action, such as a boycott or fair trade movement, is in motion to standardise environmental behaviour then individual behaviour is impacted upon (Crane, 2010). Therefore, this collectivist notion may increase the individual's motives to buy environmentally friendly products (Kim & Choi, 2005).

According to Ozaki (2011), normative influences plays a significant role in the decision making process of an individual. For instance, an individual that associates with a group of people who share an environmental concern about global warming will likely have an effect on that individual's thought process. This can be extended to the individual's behaviour of purchasing solar panels because being a part of such a group can identify whether or not their actions is

expected or accepted by the group (Ozaki, 2011). Normative beliefs are important because it has a significant bearing on the individual's behaviour that reflects their membership of a group and creates an identity of belonging (Ozaki, 2011). In the previous research conducted by Ozaki (2011), normative beliefs were the strongest influence on intention.

Accordingly hypotheses 2 and 3 propose that:

- H² There is a positive correlation between normative beliefs and intention to purchase solar panels.
- H³ Normative beliefs will be the strongest predictor of intention to purchase solar panels.

2.5.3 Control Beliefs

Control beliefs refer to the perceived control individuals have over the decision making process (Ajzen, 2005). The stronger the individual believes that an action can be taken, the more likely that action will be initiated (Ajzen, 2005). For example, "I have the money to buy that house therefore, I will". According to Reddy and Painuly (2004), there are four potential behavioural barriers that are likely to discourage consumers to buy solar panels: perceived sacrifice of the consumer (egoistic), no interest in changing technology, constraints of consumer time and the ability to gather information to make an informed decision. Furthermore, economic and financial considerations are contributing factors to the decision to adopt solar panels (Reddy & Painuly, 2004). Sadorsky (2011) believes that the wealthier an individual is the more likely they are to purchase renewable energy products. Heaney (2006) assumes money may be a barrier towards an individual practicing an environmental behaviour especially those that attain lower incomes. Subsequently these barriers have led to studies finding although people are concerned about the environment, behaviour towards their own self-interests is more important. (Black & Cherrier, 2010; Magnusson, Arvola, Hursti, Ulla-Kaisa, Åberg & Sjöden, 2003). In addition,

governmental policy could have an influence on changing consumer behaviour concerning environmentally friendly action.

Governments using legislation could influence how market pressures may change consumer behaviour (Crane, 2010; D'Souza, 2005). Introducing strategies that may change consumer behaviour include: increasing price on environmental damaging products; decrease price on eco-friendly products or services; implement water restrictions; faze out environmentally harmful products and reward environmentally friendly behaviour such as recycling with monetary incentives (Crane, 2010; D'Souza, 2005; Hume, 2010; Kanter, 2009; Water Corporation, 2012). Government legislation could change consumer behaviour but the researcher believes that the extent of that behavioural change may be limited to the individual's ability to comply.

Although the government can initiate legislation to persuade individuals to adopt a particular set of behaviours, it may not be possible for an individual if they do not have the means to do adopt them. Therefore, it may come down to the level of the control belief an individual has. For example, the higher an individual's financial ability is to purchase solar panels, the greater the likelihood they may intend to buy the technology.

Accordingly hypothesis 4 proposes that:

- H⁴ There is a negative correlation between control beliefs and intention to purchase.

2.5.4 Intention and Behaviour

Intention is the likelihood an individual will perform a certain behaviour (Ajzen, 1975). It is deemed logical that the greater an individual's motivation to perform a behaviour, the greater chance that behaviour will be executed (Ajzen, 1991). Behaviours can be predicted by intention because a certain level of planning and instruction on behalf of the individual is necessary to adopt a behaviour (Ajzen, 1991). Understanding what the reinforcements are for the solar panel industry could allow for a greater adoption rate. Marketers will be able to successfully target the correct stimulus to change behaviour of the consumers. As indicated by Ajzen (1991), behavioural, normative and control beliefs may influence one's intention to purchase solar panels. Behavioural beliefs reflect an individual's belief that an action will lead to perceived outcome (Ajzen, 2005). Normative beliefs account for social pressure an individual feels and acts accordingly (Ajzen, 2005). Control beliefs are the ability of the individual to take an action. These factors may impact on intention which could lead to the purchasing behaviour of solar panels.

Accordingly, hypothesis 5 proposes that:

- H⁵ Intention to purchase solar panels will be predicted by behavioural, normative and control beliefs.

2.6 Summary

To date, research identifies finance as the main factor towards purchasing solar panels (Brown, 2009; Heaney, 2006; Reddy & Painuly, 2004). In light of the falling subsidies, it is the aim of this study to identify if there are any other factors that may influence homeowners of the South West region of Western Australia to purchase the technology. Using TPB, behavioural beliefs, normative beliefs and control beliefs will be tested to identify if they have an impact on intention to purchase solar panels. To reiterate, it is the intention of the researcher that the following question is to be answered:

“What are the factors influencing intention to purchase residential solar panels in South West region of Western Australia?”

In order to answer this study’s research question, five hypotheses have been proposed:

- H¹ There is a positive correlation between behavioural beliefs and intention to purchase.
- H² There is a positive correlation between normative beliefs and intention to purchase.
- H³ Normative beliefs will be the strongest predictor of intention to purchase solar panels.
- H⁴ There is a negative correlation between control beliefs and intention to purchase.
- H⁵ Intention to purchase solar panels will be predicted by behavioural, normative and control beliefs.

Testing these hypotheses could lead to answer the research question of this study. The hypotheses may identify if there are any other factors that influence intention to purchase solar panels in the South West region. If successfully identified then this study may be able to add additional dimensions to marketing firms’ campaigns to increase sales of solar panels.

CHAPTER THREE: METHOD

3.1 Introduction

Chapter Three will provide an overview of the process that the researcher undertook to collect the primary data for this study. Firstly, the type of participants and their credentials to participate in the study will be outlined. Secondly, the construction of the questionnaire will be discussed. Also, the use of pretested questions from other studies that were used in this study's questionnaire is explored. Thirdly, the procedure for distributing questionnaires will be addressed and fourthly, the ethical consideration of the distribution methods, confidentiality of respondents' respected and the type of person that participated in the survey will be explained.

3.2 Research Design

The study is using a quantitative approach. Quantitative research measures with great accuracy variables and testing hypotheses that are linked to general causal explanations (Nuemann, 2006). This approach was chosen because TPB is predominantly associated in the quantitative paradigm (Ajzen, 1991). Similar studies have also used the quantitative approach successfully by the following researches: Ajzen and Driver, 1992; , Conner, Norman and Bell, 2002; Caron, Godin, Lambert and Otis, 2004; Ozaki, 2011, Rhodes, 2011 and Tegova, 2010. Respectively these researchers used both a quantitative approach and TPB to study the following subjects: leisure activities, healthy eating, condom use, renewable energy use, problem drinking and career choice. These researchers used TPB and the quantitative approach successfully which has proven the validity of this theoretical model and the use of the data collection tool. The

success of previous studies using TPB and the quantitative approach has gained the confidence of this researcher and as such will be implemented.

3.3 Pilot Study

The majority of the questions that were used in the questionnaire were from: Ozaki's (2011) Adopting Sustainable Innovation, and Rowlands, Parker and Scott's (2002) Electricity Industry Restructuring and Residential Energy Efficient scales. A prototype questionnaire was tested and identified weaknesses were amended. As a result of the pilot study process the final questionnaire was enhanced which improved the data quality. These enhancements include: tailoring questions specific to solar panels; deleting unnecessary questions; making questions simpler for respondents to understand and creating an easy to follow format to reduce confusion.

3.4 Participants

The respondents ($N = 342$) that participated in the project were residents living in the South West region of Western Australia. They were homeowners who did not have solar panels. The South West region is described by Regional Development Australia (2012) as an area in the south west corner of Western Australia made up of 12 Local Government Areas (LGA) that include: Augusta-Margaret River, Boyup Brook, Bridgetown-Greenbushes, Bunbury, Busselton, Capel, Collie, Dardanup, Donnybrook-Balingup, Harvey, Manjimup and Nannup. During the data collection phase by the researcher, 59 towns were included in the sample covering 25 different postcodes (see figure 2 for map of region). The South West region was selected for the study for three reasons. Firstly, to verify the validity of the literature that rural people are concerned about the environment and practice a high level of environmentally friendly behaviour (Berenguer, Corraliza and Martin, 2005). Secondly, to identify using the TPB as to what belief has the strongest influence on intention to purchase. Thirdly, the South West region was a convenient area for the researcher to conduct his

primary research. Mainly because the researcher was originally a resident of the area which allowed for easier access to respondents.

Table 1 is a description of each LGA within the South West region that include: their population; the percentage of their population within the South West; the percentage of surveys representing each LGA within the South West and how many surveys were drawn from each LGA. In order to gain a balanced representation of each Local Government Area, the total population of the South West region was divided by the population of each LGA (Shire of Capel, 2011).

Table 1: Breakdown of the South West region and its LGAs

LGA	Population	% of south west	% of total samples collected	Draw
Bunbury	34 623	21.35	20.20	69
Busselton	31 767	19.58	17.50	60
Harvey	24 151	14.89	12.90	44
Capel	13 370	8.24	7.00	24
Dardanup	13 125	8.09	7.30	25
Augusta-Margaret River	12 509	7.71	8.80	30
Manjimup	10 159	6.26	5.80	20
Collie	9 470	5.83	5.30	18
Donny Brook-Bailingup	5 473	3.37	5.00	17
Bridgetown-Greenbushes	4 560	2.81	5.60	19
Boyup Brook	1 619	0.99	1.80	6
Nannup	1 338	0.82	2.90	10
Total	162164	100%	100%	342



Figure 2: Map of the South West region

3.5 Instrument

The questionnaire was primarily constructed by tested questions from prior studies from the following researchers and their questionnaires: Ozaki's (2011) Adopting Sustainable Innovation, and Rowlands, Parker and Scott's (2002) Electricity Industry Restructuring and Residential Energy Efficient scales. The questionnaire was divided into five sections that comprise of: behavioural beliefs, normative beliefs, control beliefs, intentions and demographics.

3.5.1 Behavioural Beliefs

Behavioural beliefs were measured using modified versions of Ozaki's (2011) Adopting Sustainable Innovation, and Rowlands, Parker and Scott's (2002) Electricity Industry Restructuring and Residential Energy Efficient scales. Specifically, behavioural beliefs were measured by 19 items and the following are four examples:

- *I think that if everyone buys solar panels there will be a reduction in carbon emissions*
- *I think the government should let industry decide how best to supply energy*
- *My energy habits are pretty much fixed and I do not think I could conserve much*
- *I feel that reducing an individual's carbon footprint is a good thing*

Participants were asked to indicate their responses from strongly disagree [1] to strongly agree [6]. Behavioural beliefs, normative beliefs, control beliefs and intention were measured using a six-point scale in the present study, opposed to a five-point scale as employed by Ozaki's (2011) and Rowlands, Parker and Scott (2002). The optimum number of responses is between four and seven to maximise the fundamental psychometric properties of a scale, however, including six possible responses is more common practice (Lozano, Garcia-Cueto & Muniz, 2008). Prior to analysis, the following items were reversed scored: 6D

(Energy conservation at home would lead to a worsening of my quality of life), 6E *(I think even if everyone tries to conserve energy at home, it wouldn't make a big impact on energy use in Australia)*, 6P *(I think that individuals purchasing solar panels is not enough to make a real change)* and 6S *(I don't believe in climate change, so purchasing solar panels will not make a difference)*. According to Sekeran (2000), coefficients of less than .6 are considered poor internal consistency, .7 indicates acceptable consistency and .8 or above indicates good internal consistency. Cronbach's alpha for behavioural beliefs was acceptable ($\alpha = .78$). Although Armitage and Conner (2001) state that many studies using TPB have "failed to report reliability statistics", it does meet the acceptable threshold indicated by Sekeran (2000). It is also consistent with studies in other fields such as health ($\alpha = .84$) (Conner, Norman & Bell, 2002) and policy making ($\alpha = .73$) (Boyko, Lavis, Dobbins & Souza, 2011). Further investigation using *if item deleted*, did improve the overall consistency of the variable, therefore 15 items were retained.

3.5.2 Normative Beliefs

Normative beliefs were measured using modified versions Ozaki's (2011) Adopting Sustainable Innovation, and Rowlands, Parker and Scott's (2002) Electricity Industry Restructuring scales. Specifically, social beliefs was measured by 16 items and the following are three examples:

- *Climate change will be a very serious problem for me and my family*
- *I feel a personal obligation to do whatever I can to prevent climate change*
- *I would be willing to pay 5% more on everything to protect the environment*

Participants were asked to indicate their responses from strongly disagree [1] to strongly agree [6]. There were no reverse coded items in this section. Cronbach's alpha for social beliefs was .93, which is well above the acceptable threshold of .7 (Sekeran, 2000). It is also consistent with studies in other fields such as health ($\alpha = .73$) (Conner, Norman & Bell, 2002) and policy making ($\alpha = .79$) (Boyko, Lavis, Dobbins & Souza, 2011). Although Armitage and Conner (2001) state that many studies using TPB have "failed to report reliability statistics", it does meet the acceptable threshold indicated by Sekeran (2000). It is also consistent with studies in other fields such as health ($\alpha = .84$) (Conner, Norman & Bell, 2002) and policy making ($\alpha = .73$) (Boyko, Lavis, Dobbins & Souza, 2011).

3.5.3 Control Beliefs

Control beliefs was measured using modified versions of using Ozaki's (2011) Adopting Sustainable Innovation, and Rowlands, Parker and Scott's (2002) Electricity Industry Restructuring and Residential Energy Efficient scales. Specifically, control beliefs was measured by 12 items and the following are three examples:

- *Having too many other things to do would prevent me from adopting solar panels*
- *My motivation is low, and this would prevent me from purchasing solar panels*
- *I believe that it will take too long for the system to pay itself off*

Participants were asked to indicate their responses from strongly disagree [1] to strongly agree [6]. Question 8F (*It would be easy for me to purchase solar panels*) was reversed coded. Cronbach's alpha for control beliefs was .73, which meets the acceptable threshold indicated by Sekeran (2000). It is

also consistent with previously reported finding in policy making ($\alpha = .68$) (Boyko, Lavis, Dobbins & Souza, 2011).

3.5.4 Perceived Intention

Intention to purchase solar panels was measured using a modified version of Rowlands, Parker and Scott (2002) Residential Energy Efficient Project scale. Specifically, perceived intention was measured by seven items and the following are three examples:

- *I intent to purchase solar panels because of my environmental concerns*
- *I intent to purchase solar panels because of the financial benefits it will return*
- *Current government subsidy will encourage me to purchase solar panels*

Participants were asked to indicate their responses from strongly disagree [1] to strongly agree [6]. There were no reverse coded items in this section. Cronbach's alpha for intention to purchase well above the acceptable threshold of .7 ($\alpha = .91$). This is consistent with studies in other fields such as health ($\alpha = .89$) (Conner, Norman & Bell, 2002) and policy making ($\alpha = .89$) (Boyko, Lavis, Dobbins & Souza, 2011).

3.6 Procedure

Taking a quantitative approach, surveys were personally handed out by the researcher. Surveys were also dispensed at the South West ECU campus and, a local soccer club (Bunbury United Soccer Club inc.). These were secure places that achieved a high return rate of completed surveys. Public places such as coffee shops were also used by the researcher to dispense surveys. The survey took a respondent 10 to 15 minutes to complete the questionnaire. Of 400 surveys distributed, 342 were usable, resulting in an 85.5 per cent response rate. This is greater than a previously reported response rate in a rural context of 180

respondents that participated in the Berenguer, Corraliza and Martin (2005) study.

Quantitative research was used therefore, non-probability sampling was exercised (Neumann, 2006). The technique of snowball and convenience sampling was seen as the most appropriate approach. Snowball sampling is referral based and convenience sampling is where the research selects anyone who is easy to access and are eligible to participate in the questionnaire (Neumann, 2006). The snowball approach is a non-random sample where the researcher acquires additional cases through referrals (Neumann, 2006). There are potential limitations of the snowball and convenience approach. Both convenience and snowball sampling do have the risk of not attaining a representative sample of the desired demographic respondents (Neumann, 2006).

3.7 Data Analysis

This study has used hierarchical multiple regression to test each independent variable (behavioural beliefs, normative beliefs and control beliefs) being assessed in terms of what it adds to the prediction of the dependent variable (intention) (Pallant, 2007). In essence, it is a tool to identify what belief has the strongest influence towards intention to purchase solar panels. The program SPSS version 20 was used during the study to implement hierarchical multiple regression.

3.8 Ethical Considerations

Once ethical approval was obtained from the ECU Research Ethics Committee, the researcher travelled to the South West region of Western Australia and personally distributed self-administered questionnaires. Prior to data collection, permission was also obtained by a sporting club and an educational institution to distribute a number of surveys on their premises. The researcher discussed the study as being designed to identify attitudes towards

solar power adoption in the South West region of Western Australia. Then respondents were administered with the pen to paper format of the Energy Resource Survey (refer to Appendix B), which also had a Participant Information Letter (refer to Appendix C) attached to it, and informed that all details would be kept confidential, that participation was voluntary and anonymous, and if they were to feel uncomfortable completing the questionnaire, they could exclude themselves from the study without any penalty or repercussion. Participants were also required to be over the age of 18 years. Respondents returned the completed questionnaire to the researcher on site.

3.9 Summary

The chapter has provided a detailed overview of the methodological approach to this research project. It described the development of the questionnaire and also the validity of the model. The type of participant was discussed along with the ethical guidelines the researcher adhered to concerning the interaction between researcher and participant. The procedure that entailed the way surveys were to be distributed and the type of data analysis that will be used was highlighted. The results obtained through the implementation of this research design are presented in the following chapter.

CHAPTER FOUR: RESULTS

4.1 Introduction

Chapter Four discusses the results of the data that were collected by the study's questionnaire and analysed by the program, SPSS. In order to address the hypotheses, hierarchical multiple regression was chosen to determine which belief system (attitudinal, normative and control beliefs) best predicts intention to purchase solar panels. The following results have been divided into four categories: descriptives; hypothesis 1, 2, 4; hypothesis 3, 5 and Exploratory Factor Analysis. These results help to understand what factors contribute towards the homeowners of the South West region to purchase solar panels.

4.2 Descriptives

The respondents of this study were homeowners of the South West region of Western Australia who do not have solar panels. The sample were 238 females (69.6%) and 102 males (29.8%) with half the sample (50.6%) between the ages of 35 and 54. The majority (57.0%) of household income of the South West was between \$50 000 and \$149 999. Furthermore, 59.6 per cent of respondents are currently paying off their homes, while 36.5 per cent own their homes outright. In terms of highest education level within the household, 41.3 per cent of respondents of the South West have acquired either a TAFE certificate or a Diploma.

To understand people's energy efficiency and environmental behaviours, enabling further background information to be sought, questions about retrofitting their homes were asked. The response indicates that ($N = 339$) 74.6 per cent of respondents have retrofitted their homes. Further detail as to what kind of retrofitting has been done includes the following: ($n = 337$) 68.4 per cent have insulated their roof space; ($n = 338$) 26.0 per cent have wall insulation; ($n = 338$) 4.1 per cent have double glazed windows; ($n = 338$) 43.9 per cent have full

block out blinds; ($n = 338$) 21.3 per cent have awnings; ($n = 338$) 19.6 per cent have airtight doors/window seals; ($n = 337$) 34.5 per cent have LED lights and ($n = 338$) 5.8 per cent have smart meters.

The following results are related to the respondents' indications toward: time lived in current home; age of current home; expected time they will continue to live in their current home; the external infrastructure of their home and if there are any plans to renovate or buy a new home in the near future. The results show that 61.1 per cent of respondents have lived in their current home between zero and nine years. Furthermore, 55.3 per cent of respondents suggest that the age of their current home is between zero and 19 years of age. The figure of 62.6 per cent indicates that respondents will live in their current homes between zero and 14 years. In addition, 30.1 per cent of respondents indicated that they would live in their current homes for 20 years or more. Finally, 59.1 per cent of respondents have indicated that they have no plans in the near future to commence any renovations or to build a new home.

To gain an understanding of the sample, the questionnaire incorporated items relevant to current environmental behaviours and attitudes that may impact on future solar panel purchasing in the South West region. Respondents ($N = 339$) were asked to indicate whether they would consider purchasing environmentally friendly items that are more expensive than conventional items. A majority of 82.7 per cent of respondents indicated they are in favour of purchasing environmentally friendly products, despite the additional price ($M = 0.83$; $SD = 0.37$). Of those who are in favour of purchasing environmentally friendly products ($n = 130$), indicated that an item which is worth \$10, would be willing to spend an additional \$1-\$3 (38%) extra.

The following question identified what the perceptions people of the South West region have towards current types of energy production. As indicated in table 2, respondents were asked to indicate whether current power

sources have a negative impact (1) to no impact (6) in terms of environmental damage. Current power sources that were indicated as having the most negative impact were nuclear ($M = 2.10$; $SD = 1.44$), coal ($M = 2.26$; $SD = 1.23$) and oil ($M = 2.49$; $SD = 1.27$). In contrast, the power sources as indicated as having the least negative impact were solar ($M = 5.15$; $SD = 1.25$), wind ($M = 5.00$; $SD = 1.24$) and tidal ($M = 4.73$; $SD = 1.30$).

Table 2: Perceived environmental impact of respondents of the South West region

Power source	<i>M</i>	<i>SD</i>
Solar	5.15	1.25
Wind	5.00	1.24
Tidal	4.73	1.30
Micro Hydro Power	4.57	1.18
Thermal	4.47	1.27
Large Scale Hydro Power	4.35	1.27
Bio Energy	4.28	1.19
Natural Gas	3.39	1.30
Oil	2.49	1.27
Coal	2.26	1.23
Nuclear	2.10	1.44

Table 2 highlights the current perceptions of homeowners in the South West region. The table shows that solar power (solar panels) is perceived to be the most environmental friendly way of producing energy. This is an opportunistic situation to increase sales of solar panels by affirming the technology's positive image regarding the environment.

Furthermore, respondents were asked to indicate whether they had previously opted to purchase 'Green' energy from Synergy. The results indicate that the majority (89.8%) have not opted to purchase 'Green' energy from Synergy. Of those, 36.8 per cent indicated that they would *somewhat likely* (from [1] highly unlikely to [6] highly likely) consider purchasing in the future and of those, 33.6 per cent would be prepared to pay 25 per cent extra on their current power bill to receive 'Green' energy. Finally, respondents were asked to indicate whether purchasing solar panels would make a positive difference to the environment. The response indicated that 37 per cent ($M = 4.60$; $SD = 1.13$) of respondents agree that their individual purchase of solar panels would make a positive difference to the environment. Summing up, the respondents of this study were homeowners of the South West region of Western Australia that do not have solar panels. Almost 70 per cent of the sample were female, half of the respondents were between the ages of 35 to 54 and the majority of the household income (after tax) was between \$50 000 and \$149 999.

4.3 Hypothesis 1, 2 and 4

Hypothesis 1 proposed that there is a positive correlation between behavioural beliefs and intention to purchase. Hypothesis 2 proposed that there is a positive correlation between normative beliefs and intention to purchase. Hypothesis 3 proposed that there is a negative correlation between control beliefs and intention to purchase. In order to answer these hypotheses, correlation analysis was used. Correlation analysis is used to describe the strength and direction of the linear relationship between two variables (Pallant, 2007, p. 126). The researcher used the bivariate correlation technique for this

data analysis. This means that two variables were tested against each other to identify whether there was a relationship between them, negative or positive (Pallant, 2007). Initial analyses investigated relationships between factors within TPB variables and intention. Several relationships are reported. Firstly, the relationship between behavioural beliefs and intention to purchase solar panels was investigated using correlation coefficient. There was a moderate correlation between two variables ($r = .46, p < .01$), with higher levels of behavioural beliefs being positively associated with higher levels of intention to purchase solar panels (refer to Table 3). Therefore hypothesis 1 was supported (H¹ There is a positive correlation between behavioural beliefs and intention to purchase).

Secondly, the relationship between normative beliefs and intention to purchase solar panels was investigated using correlation coefficient. There was a strong correlation between two variables ($r = .52, p < .01$), with higher levels of normative beliefs being positively associated with higher levels of intention to purchase solar panels (refer to Table 3). Therefore hypothesis 2 was supported (H² There is a positive correlation between normative beliefs and intention to purchase).

Thirdly, the relationship between control beliefs and intention to purchase solar panels was investigated using correlation coefficient. There was a moderate negative correlation between two variables ($r = -.35, p < .01$), with higher levels of control beliefs being negatively associated with higher levels of intention to purchase solar panels (refer to Table 3), therefore supporting hypothesis 4 (H⁴ There is a negative correlation between control beliefs and intention to purchase).

Additionally, factors identified from the literature concerning age and household income (after tax) are said to have an influence on intention. Firstly, Grønhøj and Thøgersen (2009) suggest that the older an individual is the more

likely they are to purchase environmentally friendly products. Secondly, Sadorky (2011) believes the wealthier a person is the greater the potential they are to buy solar panels. These factors mentioned by previous research suggest that future marketing campaigns should consider focusing on these sub groups in an effort to increase sales. Therefore, these factors outside of TPB were tested and the results are as follows.

Firstly, the relationship between age and intention to purchase solar panels was investigated using a correlation coefficient. There was a small, negative correlation between the two variables, ($r = -.20, p < .01$), with maturity in age being negatively associated with higher levels of intention to purchase solar panels (refer to Table 3). In other words, younger individuals indicate a higher intention to purchase solar panels.

Secondly, the relationship between household income (after tax) and intention to purchase solar panels was investigated using correlation coefficient. There was no significant correlation between the two variables ($r = .03, p = n/s$), with higher levels of household income (after tax) not being associated with higher levels of intention to purchase solar panels (refer to Table 3).

Table 3: Descriptive statistics, correlations and reliabilities of key variables

Variables	Mean	SD	1	2	3	4	5	6
1. Age	3.51	1.37						
2. Household Income (after tax)	2.44	1.15	-.13*					
3. Behavioural Beliefs	4.05	0.49	-.13*	-.02	(.78)			
4. Normative Beliefs	3.47	0.99	-.09	.01	.73**	(.93)		
5. Control Beliefs	3.22	0.75	-.00	-.14*	-.22**	-.24**	(.73)	
6. Intention	3.68	1.20	-.20**	.03	.46**	.52**	-.35**	(.91)

Note. * $p < .05$, ** $p < .01$. N=342.

4.4 Hypotheses 3 and 5

It is proposed that intention to purchase could be predicted by behavioural, normative and control beliefs. It is also proposed that out of all three variables, normative beliefs would be the strongest predictor of intention to purchase. To address these hypotheses, hierarchical multiple regression was selected. Hierarchical multiple regression is a technique that is able to explore the relationship between one continuous dependent variable and a number of independent variables or predictors (Pallant, 2007). This technique can communicate how well a set of variables is able to predict a particular outcome (Pallant, 2007). Some of these predictions include: how well a set of variables is able to predict a particular outcome; which variable in a set of variables is the best predictor of an outcome; and whether a particular predictor variable is still able to predict an outcome when the effects of another variable are controlled (Pallant, 2007, p. 127).

Prior to conducting regression analyses, composite variables were created for behavioural, normative and control beliefs, as well as intention to purchase solar panels. Hierarchical multiple regression was used to assess the ability of three factors (behavioural beliefs, social beliefs and control beliefs) to predict intention to purchase solar panels. Preliminary analyses were conducted to ensure no violation of the assumptions of normality, linearity, multicollinearity and homoscedasticity. As the correlation analyses indicated a negative, significant correlation between age and intention to purchase ($r = -.20$, $p < .01$), age was entered into the regression equation to determine if it were having a confounding effect on the results. Controlling for age can test how much impact age has on intention to purchase solar panels with no contamination by any other variables (Pallant, 2007). After controlling for age, the total variance explained by the model as a whole was 31.8 per cent $F(3, 333) = 46.09$, $p < .01$. All three factors were statistically significant (behavioural beliefs $\beta = .14$, $p < .05$;

normative beliefs $\beta = .34, p < .01$; control beliefs $\beta = -.24, p < .01$), therefore, supporting hypothesis 5 (H⁵ Intention to purchase solar panels will be predicted by attitudinal, normative and control beliefs.).

Specifically of all predictive variables, normative beliefs ($\beta = .34, p < .01$) was the strongest predictor of purchasing solar panels, therefore supporting hypothesis 3 (H³ Normative beliefs will be the strongest predictor of intention to purchase solar panels) (refer to Appendix D for more details).

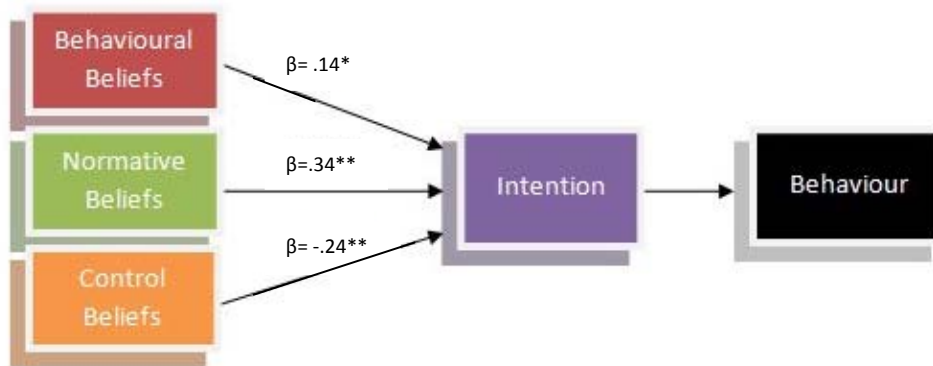


Figure 3: Regression results of beliefs on intention

4.5 Exploratory Factor Analysis

To further analyse the predictive value of normative beliefs on intention to purchase solar panels, 16 social belief items were subjected to Exploratory Factor Analysis (Principal Axis Factoring, Direct Oblimin rotation method). Exploratory Factor Analysis transforms a large set of variables and summaries them into a smaller set of factors and components (Pallant, 2007). First, the suitability of data for factor analysis was assessed. Inspection of the correlation matrix revealed the presence of all coefficients of 0.40 and above. The Kaiser-Meyer-Olkin value was 0.92, exceeding the recommended value of 0.60 (Kaiser, 1974) and Bartlett's Test of Sphericity (Bartlett, 1954) researched statistical significance ($\chi^2 = 3685.78; p < .01$), supporting the factorability of the correlation matrix.

Principal components analysis revealed the presence of two components with eigenvalues exceeding 1.00, explaining 51.05 per cent and 11.17 per cent of the variance respectively. Further analysis of the pattern matrix showed a number of strong loadings across two factors. Items that loaded on Factor 1 tended to relate to issues of the environment on a national scale (e.g. *Climate change will be a very serious problem for me and my family* and *I think that climate change will be a very serious problem for Australia*) and items that loaded on Factor 2 tended to relate to more personal issues of the environment (e.g. *My social circle encourages me to use environmentally friendly products.* and *Those closest to me influence my behaviour and how I impact the environment*). Composite variables were created in which Factor 1 was labelled *Global Environment* ($\alpha = .92$) and Factor 2 was labelled *Social Circle* ($\alpha = .90$) (refer to appendix E for more details).

These two factors were entered into regression to determine which factor had a higher prediction of intention to purchase solar panels. The total variance explained by the model as a whole was 26.7 per cent $F(2, 336) = 60.63$, $p < .01$. Both factors were statistically significant, with social circle being the stronger predictor ($\beta = .31$, $p < .01$) than global environmental concerns ($\beta = .26$, $p < .01$) (refer to figure 4) (refer to Appendix F for more details).

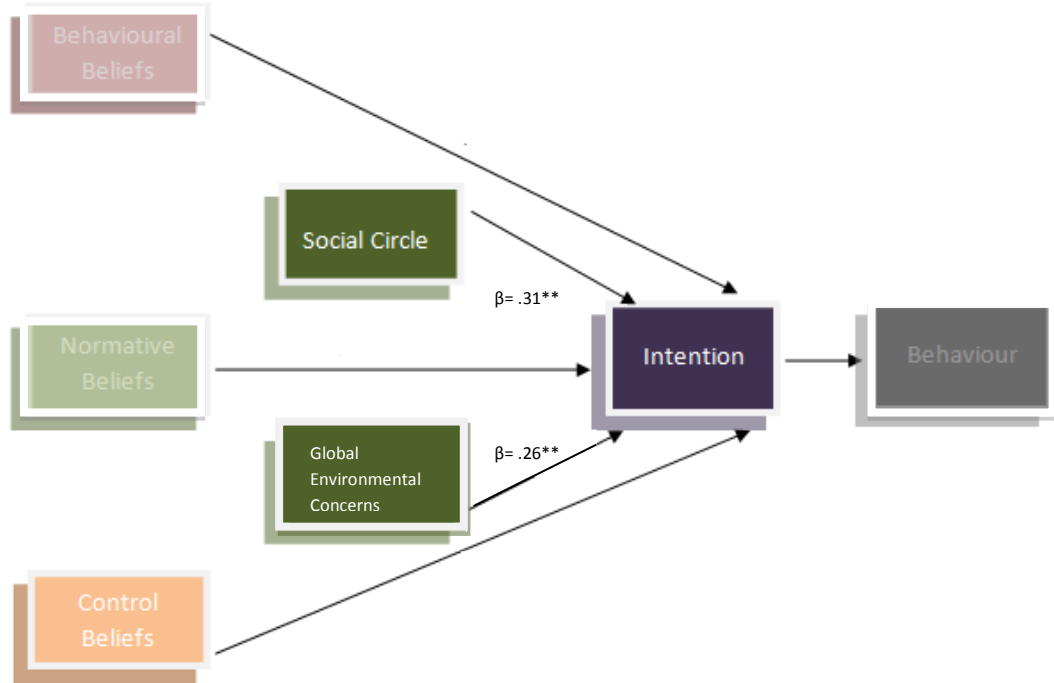


Figure 4: Regression results separating normative beliefs into sub-constructs

Table 4: Hypotheses tested and results confirmed

Hypothesis	Results
H ¹ There is a positive correlation between behavioural beliefs and intention to purchase.	Supported ($r = .46, p < .01$)
H ² There is a positive correlation between normative beliefs and intention to purchase.	Supported ($r = .52, p < .01$)
H ³ Normative beliefs will be the strongest predictor of intention to purchase solar panels.	Supported ($\beta = .34, p < .01$)
H ⁴ There is a negative correlation between control beliefs and intention to purchase.	Supported ($r = -.35, p < .01$)
H ⁵ Intention to purchase solar panels will be predicted by attitudinal, normative and control beliefs.	Supported behavioural beliefs $\beta = .14, p < .05$; normative beliefs $\beta = .34, p < .01$; control beliefs $\beta = -.24, p < .01$

4.6 Summary

This chapter has presented the results collected from the South West region of Western Australia. The data was analysed using hierarchical multiple regression to identify different variables that impact upon homeowners' intention to purchase solar panels. All hypotheses tested in this study have been supported. Furthermore, the results concluded that normative beliefs were identified as the strongest driver towards the intention to purchase solar panels. Also, age was identified in the literature as a factor influencing intention. These factors were tested and the findings both supported and did not support the literature. The following chapter discusses these results in detail and examines how the findings may affect the solar panel industry in the South West region of Western Australia.

CHAPTER FIVE: DISCUSSION

5.1 Introduction

The purpose of this study is to identify factors other than financial means that have an impact on the homeowners' intention to purchase solar panels in the South West region of Western Australia. To achieve this, a validated model needed to be used. This led to the implementation of the Theory of Planned Behaviour (TPB). This theoretical model has three factors which are believed by Ajzen (1991) to have an impact on intention. These factors include behavioural beliefs, normative beliefs and control beliefs. Each of these beliefs was tested and the results verify that all of them impact on respondents' intention to purchase solar panels. Furthermore, normative beliefs had the strongest impact on intention and through the use of Exploratory Factor Analysis, identified two sub constructs. These sub constructs were social circle and global environmental concerns. The following paragraphs will expand on each of these beliefs and sub constructs to amplify the significance they have on intention to purchase solar panels in the South West region.

Finally, this chapter will conclude with a reflection on how the findings may impact upon the solar panel industry in the South West region of Western Australia. Consequently, a comparison between previous research and this study are made. Furthermore, limitations that impacted on the study are highlighted. This will highlight areas that will need to be addressed if further research is to be conducted. Recommendations for future campaigns regarding solar panels are made and a conclusion of the thesis follows.

5.2 Behavioural Beliefs

Behavioural belief is described by Ajzen (2005) as the greater an individual's belief that an action will lead to a perceived outcome, the greater their intention to act will become. The literature that has been discussed in Chapter 2 has identified four different behavioural beliefs that increase individual's likelihood of intention to act in an environmentally friendly way. Firstly, environmentally conscious consumers' belief in purchasing products that is ecofriendly (Sadorsky, 2011). Secondly, maturity of age allows an action to take place rather than youthful idealism (Grønhøj & Thøgersen's, 2009). Thirdly, an altruistic attitude some people process which they believe will be praise from their community due to their selfless acts (Antonides & van Raaij, 1998; Griskevicius, Tyber & Van den Bergh, 2010; Semmann, Krambeck & Milinski, 2005). Fourthly, an egoistic attitude one may have which could motivate an individual to purchase solar panels for their own good (Black & Cherrier, 2010; Magnusson, Arvola, Hursti, Ulla-Kaisa, Åberg & Sjöden, 2003; Wandel & Bugge, 1997). These four examples were tested by this study to determine if behavioural beliefs have an impact on intention.

This study incorporates the four factors mentioned above in a questionnaire to measure their impact on respondents in the South West region. Behavioural beliefs cover a wide range of factors that affect a respondent's intention to purchase solar panels. Each of these factors can be investigated in greater depth in future research to determine how much each factor impacts behavioural beliefs on intention. Importantly, the findings confirm previous research that has been presented in this thesis.

Concerning environmentally conscience consumers, this study has found that 82.7 per cent of the respondents are in favour of practicing environmentally friendly behaviour. Furthermore, 74.6 per cent of respondents have retrofitted their homes to reduce their individual impact on the environment. These

findings demonstrate that the majority of respondents that participated in this study have displayed environmentally conscience behaviour.

Age is a factor that was identified by previous research as having an effect on individuals' intention on purchasing environmentally friendly products (Sadorsky, 2011). It is believed that the older a person is the greater chance they are to buy such products (Grønhøj & Thøgersen's, 2009). The current study found the opposite is true. The younger a person is the more likely they are to purchase solar panels. Therefore, future campaigns could focus on the younger demographic and position solar panels in a way that reflect the technology's environmentally friendly way of producing electricity.

Altruistic and egoistic factors are opposing attitudes that individuals possess. These characteristics are important to identify within each individual as they may have a strong determination as to what purchasing behaviour might be adopted. This study has confirmed that the majority of the respondents of this study have adopted a more altruistic attitude concerning their beliefs of global warming. The majority of respondents are worried about future generations of Australians and believe that everyone has a responsibility to conserve energy whereby, reduce carbon emissions. This leads to their belief that a greater implementation of renewable energy sites in the South West region is good for the environment. The implementation of solar farms is preferred over other sources of renewable energy as the general perception of solar is regarded as the cleanest way to produce electricity. These attitudes are reflective by the majority of respondents.

The four factors that have been identified by previous research are the components of behavioural beliefs. Behavioural beliefs have been identified by this study to have an impact upon intention to purchase solar panels. Now that these factors have been identified as having an impact on intention, the next

logical phase is to understand how this impact on intention can transform into the behaviour of purchasing solar panels.

5.3 Normative Beliefs

As alluded to previously, normative beliefs are reflected by an individual's social group's attitudes towards certain behaviours and the impact that has on that individual's motivation to perform a particular behaviour (Ajzen, 1991). This interaction between an individual and their social group is also known as social norming (Donovan & Henley, 2010). The key contribution that this thesis makes to academic knowledge is the validation of the Theory of Planned Behaviour as a model to measure behaviour. Specifically, consistent with the current study, previous research (Kim & Choi, 2005; Ozaki, 2011) has found that normative beliefs was the strongest predictor of intention to use renewable energy.

To highlight, Ozaki (2011) discovered through her study of the adoption of 'green energy' in the UK, that normative beliefs was the most significant belief that impacted an individual's intention to purchase 'green energy'. A collectivist notion was involved which increased the individual's motives to buy environmentally friendly products (Kim & Choi, 2005).

It is clear from the description of previous research that normative beliefs concerning the uptake of solar panels are important (Ozaki, 2011). Therefore, questions that respondents answered were related to the influence friends and family have on their attitude towards environmental concerns. It was found that the majority of respondents were concerned about climate change becoming a problem for Australia and their families. Specifically regarding solar panel purchase, respondents believe that they may buy solar panels if the majority of their neighbourhood have purchased the technology. Therefore, they want to be seen contributing to environmental conservation. In addition, individuals also want their closest friends and family to be

environmentally conservative. The results also imply that current advertising campaigns somewhat reinforce a positive impression towards solar panels. These components show that the impact of global warming negatively affecting an individual's family and country is of concern. Thoughts of others are an important factor to a respondent's intent to act in an environmentally friendly way. Also, this includes a respondent's intention of purchasing solar panels because of the influence of others.

This study has identified that normative beliefs have the strongest impact on intention to purchase solar panels. Furthermore, an investigation using Exploratory Factor Analysis was conducted to identify if normative beliefs could be broken into sub-constructs, which could be used to better understand how normative beliefs influence intention to purchase solar panels. Results indicated two factor solutions, which were operationalised as influences within the respondent's social circle and global environmental concerns. Of both factors, social circle influences (e.g., *I am happy to pay the carbon tax to protect the environment*) had a stronger predictive effect on intention to purchase solar panels, then did global environmental concerns (e.g., *It is important to me that those closest are contributing to environmental preservation*). These two additional factors increase the depth at which normative beliefs may impact upon intention of respondents to purchase solar panels. This, in turn, supports the strength of normative beliefs as a good marketing tool to implement. These discoveries add further dimensions toward marketing firms considering creating a campaign in an effort to increase solar panels sales in the South West region.

5.4 Control Beliefs

Control beliefs refer to the perceived control individuals have over the decision making process (Ajzen, 2005). The stronger the individual believes an action can be taken the more likely that action will be initiated (Ajzen, 2005). Conversely, there are four potential behavioural barriers that may reduce an

individual's likelihood of purchasing solar panels (Reddy & Painuly, 2004). These behavioural barriers are: perceived sacrifice of the consumer, no interest in changing technology, constraints of consumer time and the ability to gather information to make an informed decision (Reddy & Painuly, 2004). In addition, Heaney (2006) assumes money may be a barrier towards an individual practicing an environmental behaviour especially those that attain lower incomes (Reddy & Painuly, 2004). Furthermore, Sadorsky (2011) believes that the wealthier an individual is, the more likely they are to purchase renewable energy products. The barriers listed above are a reflection as to what respondents in the South West region may consider when deciding to purchase solar panels. Previous research conducted by Sadorsky (2012) and Reddy and Painuly (2004) suggest an individual's level of financial wealth has an effect on their intention to purchase solar panels. The results attained by this study show that wealth does not have an impact on respondents' intention to buy solar panels. Further investigation regarding an individual's level of financial wealth and lack of impact it has on their intention to purchase solar panels may be warranted.

The remaining three barriers are: no interest in changing technology, constraints of consumers' time and the ability to make an informed decision towards purchasing solar panels. These barriers were not perceived as factors that deter respondents to purchase solar panels.

In addition, government legislation could be seen as having an effect on control beliefs individuals (Crane, 2010; D'Souza, 2005). This can be achieved by implementing positive (subsidies) and negative (fines) reinforcement legislation which do have a strong influence (Crane, 2010; D'Souza, 2005; Hume, 2010; Kanter, 2009; Water Corporation, 2012).

The majority of respondents who participated in the study have suggested the state government does not provide enough incentives towards

purchasing solar panels. To gain perspective, this study surveyed the South West region in September which was one month after the government had reduced subsidies and suspended feed-in tariffs. The general comment by many respondents was that the lower the subsidies become the less likely many would purchase solar panels. Maughan (2012) believes this is the result of current marketing campaigns employing scare tactics to frighten consumers to buy solar panels before the reduction of subsidies occur (M. Maughan, Sales and Business Development Department, Solar 1, personal communication, October 18, 2012). Maughan believes that educating consumers of the benefits of the technology would result in a less staggered market trend and uptake of solar panels (M. Maughan, Sales and Business Development Department, Solar 1, personal communication, October 18, 2012).

Control beliefs have a small negative impact on intention. This means the greater barriers are for respondents to purchase solar panels the less likely they are to buy the technology. This leads to a focus of barriers and how they can be reduced to increase uptake of solar panels in the South West region.

5.5 Limitations and Further Research

There were two main strengths of this research project; firstly, a well-designed questionnaire and secondly, a good sample size ($N = 342$). These two strengths were instrumental giving strong validity to the final results; however, there are several limitations to address.

The main limitation for the Honours program is the limited amount of time given to complete the study. Due to time constraints, the scope of the research conducted was reduced significantly. Originally the study was to compare influence of intention towards solar panels between the South West region and the Perth metropolitan area. The purpose of this comparison was to confirm or reject the study conducted by Berenguer, Corraliza and Martin (2005) suggesting that although environmental concerns are high for both rural

and urban people; rural people are overall, more environmentally responsible. As a result, the study concentrated on the current environmental behaviours practiced by the residents of the South West region. This included whether the residents have retro fitted their homes, would pay extra for environmental friendly products and if they are willing to buy 'Green' energy from Synergy. No comparison was conducted. The findings from this study, if there was sufficient time available may have led to an insight as to whether marketing to these two different geographical locations would need specific campaign strategies or not. Ultimately, the time constraints have reduced the number of hypotheses that this researcher originally wanted to test.

If further research were to be conducted it is suggested that the study be expanded to the Perth metropolitan area. The comparisons stated above could be tested. This may also confirm or reject the study conducted by Berenguer, Corraliza and Martin (2005) which suggest that although environmental concerns are high for both rural and urban people; rural people may be overall, more environmentally responsible. If Berenguer, Corraliza and Martin (2005) study correctly reflect the findings in Western Australia then recommendations towards marketing to the two different geographical locations could be made.

This study used nonprobability sampling that implemented the snowball and convenience approach. Through these approaches, the study was able to collect 342 usable surveys. The researcher is aware that these approaches do have some limitations that may have affected the results. Firstly, the nature of nonprobability sampling indicates that a representative sample size may not be achieved (Neumann, 2006). Secondly, there is a risk using the snowball and convenience approaches of not attaining a representative sample of the desired demographic respondents (Neumann, 2006). In light of these two limitations, further research using probability sampling is recommended to verify the results of this study.

A further limitation concerning the data collection process is that questionnaires were self-administered (Neumann, 2006). This issue increases the probability that some questions were incorrectly answered due to human error, respondents' lack of knowledge, not understanding the question or not answering a question at all (Neumann, 2006). These issues may have affected the results of this study.

The lack of resources at the disposal of the researcher for this study had a restraining affect as to how many surveys could be collected. However, 342 usable surveys are sufficient for an Honours study but the sample size is not large enough to be generalised to the greater population of the South West region (Neumann, 2006).

If further research is to be undertaken it is recommended that the research obtains assistance from others for data collection. This will not only speed up the data collection phase but could also increase the number of questionnaires completed. This in turn could increase the sample size which potentially could be large enough to be generalised toward the population of the South West region.

5.6 Industry Recommendations

The results achieved by this study have shown the beliefs contained in TPB have an influence on intention to purchase solar panels. These results are strictly contained to the respondents of the South West region. This also leads to other factors which marketing firms or policy makers can focus on when creating a campaign for the future. It is also suggested that the study be replicated in other regions to see if the findings are consistent.

It is recommended that any marketing firm take into consideration the results attained by this study. It has been discussed that normative beliefs has the strongest impact on intention. Additionally, normative beliefs have two sub constructs: social circle and global environmental concerns which, gives the

belief greater dimensions containing to social influences. Furthermore, behavioural and control beliefs also have an impact on intention.

Normative beliefs has the strongest impact on intention therefore, it is advised that future marketing campaigns involve factors related to this belief. The discovery of social influence on respondents may lend itself to creating a campaign which involves targeting groups or communities of people rather than the individual. A group discount strategy on solar panels may be an effective way to increase the uptake of the technology. This assumption is based on the general consensus of the South West that if the majority know people who have solar panels then that will greatly increase their intention to purchase the technology. Solar companies should also consider establishing relationships with shire counsels in the South West. These companies could sell solar panels in a large quantity to individual counsels and in turn, the counsels can sell the solar panels to their constituents at a reduced price.

Behavioural beliefs are the second strongest belief to impact upon intention to purchase solar panels. Based on an industry perspective, the researcher believes that behavioural beliefs may have a stronger impact on intention if homeowners are better informed about the benefits of solar panels. Currently, the general belief is that solar panels are not worth the investment compared to previous years when the subsidies were more significant. The industry believes that solar panels are worth the investment but homeowners must be educated as to why this may be the case. This includes benefits such as: minimising a household's power bill, limiting the reliance of the electrical grid, reducing an individual's carbon footprint on the environment and essentially enabling a person's desire to actively contribute a positive change in their society. If homeowners have greater awareness of these benefits then a change of attitude towards the technology may occur, resulting in an increase of solar panel sales.

Control beliefs highlighted that barriers of purchasing solar panels have a negative impact on intention. These barriers include financial difficulty buying solar panels and the perception that they take too long to recover the costs of purchase. The barriers mentioned should be addressed with a focus on financial planning for homeowners who want to buy solar panels. This includes the allowance for instalment payments over a predetermined period of time. This could alleviate the financial barrier to purchase the technology.

The researcher believes that the most effective way to implement these beliefs is to use them together. All three beliefs focus on different dimensions which will give a future campaign a greater impact on homeowners' intention to purchase solar panels.

Government subsidies are still perceived by respondents in the South West as an important part in the thought process of purchasing solar panels. The respondents in this study strongly believe that the state government is not doing enough to provide incentive to purchase solar panels. This could be related to the reduction of subsidies over recent years and the suspension of feed-in tariffs. If the government are not going to increase subsidies in the future it is advised by this researcher that it does not reduce it any further. This suggestion is based on the general belief of respondents in the South West that solar panels are expensive. As discovered by the control beliefs, if the barriers to purchase the technology are too high then intention to buy solar panels is diminished.

The response from one company in the solar panel industry implied that a new way of marketing may be needed. It is believed that current marketing campaigns are damaging to the industry as they are focused on short term sales rather than long term prosperity. This creates an opportunity for the industry to implement a new marketing campaign that uses the three beliefs that impact upon intention.

5.8 Conclusion

This study focused on the actions of the individual homeowner to find what will influence homeowners to purchase solar panels that are not related to financial decision making. Using Ajzen's (1991) model of TPB the study has tested factors that are believed to impact upon the intention to purchase solar panels. The findings have identified influences that are uniquely specific to homeowners of the South West region of Western Australia. These results could assist marketing firms to create campaigns that may achieve an increase in solar panel uptake in the South West region. The findings could also be of assistance to government in the formation of policy seeking to encourage the uptake of solar panels by householders.

Reference List

- Aanesen, K., Heck, S., & Pinner, D. (2012). *Solar Power: Darkest before Dawn*. Retrieved from The McKinsey & Company Website: [http://www.mckinsey.com/Search.aspx?q=solar power darkest before dawn](http://www.mckinsey.com/Search.aspx?q=solar+power+darkest+before+dawn)
- Ajzen, I. (2005). *Attitudes, personality and behaviour* (2nd ed.). Berkshire, England: McGraw-Hill Education.
- Ajzen, I. (1991). The theory of planned behaviour. *Organizational Behaviour and Human Decision Processes*, 50(2), 179-211.
- Ajzen, I., & Driver, B. L. (1992). Application of the theory of planned behaviour to leisure choice. *Journal of Leisure Research*, 24(3), 207-224.
- Ajzen, I., & Fishbein, M. (1975). *Belief, attitude, intention and behavior: An introduction to theory and research*. Vermont South, Australia: ARRB Group Limited.
- Antonides, G., & van Raaij, W., F., (1998). *Consumer behaviour: A European perspective*. Chichester, England: John Wiley & Sons Ltd.
- Aleklett, K., Hook, M., Jakobsson, K., Lardelli, M., Snowden, S., & Soderbergh, B. (2010). Energy policy 2008: The peak of the oil age – analyzing the world oil production reference scenario in world energy outlook. *Energy Policy*, 38(3), 1398–1414.
- Allen, R. D., Seaman, S. M., & DeLascio, J. E. (2009). Emerging issues: Global warming claims and coverage issues. *Defence Counsel Journal*, 76(1), 12.
- Anderegg, W. R. L., Prall, J. W., Harold, J., & Schneider, S. H. (2010). Expert credibility on climate change. *National Academy of Science*, 107(27), 12107-12109.
- Australian Government, (2012a), *Clean energy future*. Retrieved from The Australian Government Website: http://australia.gov.au/search?meta_C_phrase_sand=topics&advancedSearch=false&form=simple&collection=gov_combined&coverage=info&query=carbon+tax

- Australian Government. (2012b). *Clean energy regulator*. Retrieved from the Australian Government Website:
<http://ret.cleanenergyregulator.gov.au/About-the-Schemes/Small-scale-Renewable-Energy-Scheme--SRES-/about-sres>
- Bartlett, M.S. (1954). A note on the multiplying factors for various chi square approximations. *Journal of the Royal Statistical Society*, 16 (Series B), 296-8.
- Belluscio, A. (2010). What lies beneath Antarctic ice. Retrieved from the Nature Website:
<http://www.nature.com.ezproxy.ecu.edu.au/news/2010/100903/full/news.2010.442.html>
- Berenguer, J., Corraliza, J. A., & Martín, R. (2005). Rural-urban differences in environmental concern, attitudes, and actions. *European Journal of Psychological Assessment*, 21(2), 128-138.
- Bilgin, M. (2009). Energy policy: Geopolitics of European natural gas demand: Supplies from Russia, Caspian and the Middle East. *Energy Policy*, 37(11), 4482-4491.
- Black, I., & Cherrier, H. (2010). Anti-consumption as part of living a sustainable lifestyle: Daily practices, contextual motivations and subjective values. *Journal of Consumer Behaviour*, 9(6), 437-453.
- Box, D., Wakeman, T., & Smith, J. (2005). The end of cheap oil the consequences. *The Ecologist*, 35(8), 46-53.
- Boyko, J. A, Lavis J. N., Dobbins, M., & Souza, N. M. (2011). Reliability of a tool for measuring theory of planned behaviour constructs for use in evaluating research use in policymaking. *Health Research Policy and Systems*, 9(29), 1-7.
- Brown, S. (2009). Turning off the sun: As energy prices soar, solar electricity should be a smart investment-but are the incentives strong enough? *Choice Australian Consumers' Association*. August, 25.
- Caron, F., Godin, G., Otis, J., & Lambert, L. D. (2004). Evaluation of a theoretically based AIDS/STD peer education program on postponing sexual intercourse and on condom use among adolescents attending high school. *Health Education Research*, 19(2), 185-197.

- Clean Energy Council. (2012a). Regional towns and outer suburbs the bright spots for WA solar. Retrieved from the Clean Energy Council Website: <http://www.cleanenergycouncil.org.au/mediaevents/media-releases/April-2012/110413/WA.html>
- Clean Energy Council. (2012b). Renewable energy target is key to US\$257 billion global market. Retrieved from the Clean Energy Council Website: <http://www.cleanenergycouncil.org.au/mediaevents/media-releases/September-2012/120918-Christine-Lins.html>
- Conner, M., Norman, P., & Bell, R. (2002). The theory of planned behaviour and healthy eating. *Health Psychology, 21*(2), 194-201.
- Crane, D. (2009). Environmental change and the future of consumption: Implications for consumer identity. *Anuario Filosofico, 43*(2), 353.
- Department of Regional Development and Lands. (2012). Retrieved from the Government of Western Australian Website: <http://www.rdl.wa.gov.au/regions/southwest/Pages/default.aspx>
- Dolata-Kreutzkamp, P. (2008). Canada-Germany-EU: Energy security and climate change. *International Journal, 63*(3), 665-681.
- Donovan, R., & Henley, N. (2010). *Principles and practice of social marketing: An international perspective*. (2nd ed.) East Hawthorn, Australia: IP Communications.
- D'Souza, C. (2005). Proactive environmentalism: An examination of the Australian consumer market. *Electronic Green Journal, 22*, 2-16.
- Dunlop, I. (2010). Climate change. *Chemistry in Australia, 77*(3), 35.
- ESAA. (2012). Australia's renewable energy target. Retrieved from the ESAA Website: http://www.esaa.com.au/content/detail/australia%E2%80%99s_renewable_energy_target
- Energy in Australia. (2012). Retrieved from the Australian Government Website: <http://bree.gov.au/documents/publications/energy/energy-in-australia-2012.pdf>

- Energy Matters. (2012a). Australian solar credits program. Retrieved from the Energy Matters Website:
<http://www.energymatters.com.au/government-rebates/solar-credits-australia.php>
- Energy Matters. (2012b). Feed-in tariff for grid-connected solar power systems. Retrieved from the Energy Matters website:
<http://www.energymatters.com.au/government-rebates/feedintariff.php#fit-table>
- Ferguson, J. & Barrett, R. (2010, September 4). Victoria cuts solar power subsidies. *The Australian*. Retrieved from The Australian Website:
<http://www.theaustralian.com.au/national-affairs/victoria-cuts-solar-power-subsidies/story-fn59niix-1226464282004>
- Geothermal Energy HQ. (2010). Top 5 nations that use renewable energy. Retrieved from the Geothermal Energy HQ website:
<http://www.geothermalenergyhq.com/geothermal-energy-news/top-5nations-that-use-renewable-energy/>
- Gradziuk, A., & Wyciszkievicz, E. (2009). Energy security and climate change: Double challenges for policymakers. *The Polish Quarterly of International Affairs*, 19(3), 107.
- Griskevicius, V., Tybur, J.M. & Van der Bergh, B. (2010). Going green to be seen: Status, reputation, and conspicuous conservation. *Journal of Personality and Social Psychology*, 98, 392-404.
- Grønhøj, A., & Thøgersen, J. (2009). Like father, like son? Intergenerational transmission of values, attitudes and behaviours in the environmental domain. *Journal of Environmental Psychology*, 29(4), 414–421.
- Grønhøj, A., & Thøgersen, J. (2012). Actions speak louder than words: The effect of personal attitudes and family norms on adolescents' pro environmental behaviour. *Journal of Economic Psychology*, 33(1), 292-302.
- Hanna, E., Huybrechts, P., Steffen, K., Cappelen, J., Huff, R., Shuman, C., Irvine-Fynn, T., Wise, S., & Griffiths, M. (2008). Increase runoff from melt from the Greenland ice sheet: A response to global warming. *Journal of Climate*, 21(2), 331-341.
- Heaney, J. (2006). Generations X and Y's internet banking usage in Australia. *Journal of Financial Services Marketing*, 11(3), 196-210.

- Hirabayashi, Y., Kanae, S., Emori, S., Oki, T., & Kimoto, M. (2008). Global projections of changing risks of floods and droughts in a changing climate. *Hydrological Sciences Journal*, 53(4), 754-772.
- Hume, M. (2010). Compassion without action: Examining the young consumers consumption and attitude to sustainable consumption. *Journal of World Business*, 45(4), 385-394.
- Intergovernmental Panel on Climate Change. (2007). *Climate change 2007: The physical science basis*. Cambridge, UK: Cambridge University Press.
- Irwin, J. & Raghunathan, R. (2010). How do customers evaluate energy-efficient products? Retrieved from the Energy Insights Website: <http://blogs.mcombs.utexas.edu/titman/2010/01/29/how-do-consumers-evaluate-energy-efficient-products>
- Kanter, J. (2009, September 1). Europe sees the light, and it's fluorescent. *The International Herald Tribune*. Retrieved from <http://www.lexisnexis.com>
- Kerr, R. A. (2007). Global warming. How urgent is climate change? *Science*, 318(5854), 1230-1231.
- Kim, Y., & Choi, S.M. (2005). Antecedents of green purchase behaviour: An examination of collectivism, environmental concern, and PCE. *Advances In Consumer Research*, 32, 592-599.
- Labatt, S., & White, R. (2007). *Carbon finance: The financial implications of climate change*. Chichester, England: John Wiley & Sons Ltd.
- Lozano, L. M., Garcia-Cueto, E. & Muniz, J. (2008). Effect of the number of response categories on the reliability and validity of rating scales. *European Journal of Research Methods for the Behavioural and Social Sciences*, 4(2), 73-79.
- Lorenzoni, I. & Pidgeon, N. F. (2006). Public views on climate change: European and USA. *Climate Change*, 77(1), 73 - 95.
- Magnusson, M. K., Arvola, A., Hursti, U-K. K., Åberg, L., & Sjöden, P-O. (2003). Choice of organic foods is related to perceived consequences for human health and to environmentally friendly behaviour. *Appetite*, 40(2), 109 - 117.

- May, B. (2010). Energy security and climate change: Global challenges and national responsibilities. *South Asian Survey*, 17(1), 19-30.
- Mohnen, V. A., Goldstein, W., & Wang, W. C., (1991). The conflict over global warming. *Global Environmental Change*, 1(2), 109-123.
- Moore, T. G. (2008) Global warming: The good, the bad, the ugly and the efficient. Retrieved from the NCBI Website:
<http://www.ncbi.nlm.nih.gov/pmc/articles/PMC3317379/?tool=pmcentrez>
- Morton, A. (2012). Government axes rebates for solar panels. *Sunday Morning Herald*. Retrieved from the Sunday Morning Herald Website:
<http://www.smh.com.au/opinion/political-news/rebate-for-solar-hot-water-axed-20120228-1u140.html>
- Neumann, W. L. (2006) *Social research methods: Qualitative and quantitative approaches* (6th ed.). Boston, MA: Pearson International Edition.
- Nicholls, N. (2010). Climate change. *Chemistry in Australia*, 77(5), 36.
- Oerlemans, J. (1994). Quantifying global warming from the retreat of glaciers. *Science*, 264(5156), 243-245.
- Ozaki, R. (2011). Adopting sustainable innovation: What makes consumers sign up to green electricity?. *Business Strategy and the Environment*, 20 (1), 1-17.
- Pallant, J. (2007). *SPSS: Survival manual*. Crows Nest, Australia: Allen & Unwin.
- Patrinos, A., & Bradley, R. (2009). Energy and technology policies for managing carbon risk. *Science*, 325(5943), 949-950.
- Prothero, D. R. (2012). How we know global warming is real and human caused. *Skeptic*, 17(2), 14.
- Reddy, S. B., & Painuly, J. P. (2004). Diffusion of renewable energy technologies- barriers and stakeholders perspectives. *Renewable Energy*, 29(9), 1431-1447.
- Rhodes, T. (2011). College students and binge drinking: An application of the theory of planned behaviour (M.A. Thesis). Retrieved from, UMI Dissertations Publishing.

- Richards, J. (2003). *Solar power*. South Yarra, Australia: MacMillian Library.
- Rogers-Hayden, T., Hatton, F., & Lorenzoni, I. (2011). Energy security' and 'climate change': Constructing UK energy discursive realities. *Global Environmental Change*, 21(1), 134-142.
- Rowlands, I. H., Parker, P., & Scott, D. (2002). Consumer perceptions of "green power". *The Journal of Consumer Marketing*, 19(2), 112-112.
- Rubin, R. (2007). *Why your world is about to get a whole lot smaller*. New York, NY: Random House.
- International Energy Agency. (2009). *World Energy Outlook 2009*. Retrieved from the International Energy Agency Website:
<http://www.iea.org/textbase/nppdf/free/2009/weo2009.pdf>
- International Energy Agency. (2010). *Renewables 2010: Global statues report*. Retrieved from the REN21 Website:
http://www.ren21.net/Portals/97/documents/GSR/REN21_GSR_2010_full_revised%20Sept2010.pdf
- Sadorsky, P. (2011). Some future scenarios for renewable energy. *Energy Policy*, 43(10), 1091-1104.
- Schilling, M. A., & Esmundo, M. (2010). Technology s-curves in renewable energy alternatives: Analysis and implications for industry and government. *Energy Policy*, 37(5), 1767-1781.
- Seinfeld, J. H. (2011). Insights on global warming. *AIChE*, 57(12), 3259-3284.
- Seale, K., & Gow, K. (2010). Do concerns about climate change lead to distress?. *Journal of Climate Change Strategies and Management*, 2(4), 362 - 369.
- Sekeran, U. (2000). *Research methods for business: A skill-building approach* (3rd ed.). New York, NY: John Wiley and Sons.
- Semmann, D., Krambeck, H., & Milinski, M. (2005). Reputation is valuable within and outside one's social group. *Behavioural Ecology and Sociobiology*, 57, 611-616.
- Shakun, J. D., Clark, P. U., He, F., Marcott, S. A., Mix, A. C., Liu, Z., Otto-Bliesner, B., Schmittner, A., & Bard, E. (2012). Global warming preceded by increasing carbon dioxide concentrations during the last deglaciation. *Nature Publishing Group*, 484(7392), 49.

- Shi, W., Wang, S., & Yang, Q. (2010). Climate change and global warming. *Reviews in Environmental Science and Bio/Technology*, 9(2), 99-102.
- Shire of Capel. (2011). *Shire of Capel local profile*. Retrieved from the Shire of Capel website:
<http://www.capel.wa.gov.au/Portals/0/Doc/publications/Shire%20of%20Capel%20Local%20Profile.pdf>
- Spencer, R. W. (2005) How serious is the global warming threat?. *Social Science and Public Policy*, 44(5), 45-50.
- Stafford, P. (2011). Carbon tax: A sector by sector guide. Retrieved from the Smart Company Website: <http://www.smartcompany.com.au/climate-change/20110711-how-will-the-carbon-tax-affect-your-business-a-sector-by-sector-guide.html>
- Stern, N. (2007). *The economics of climate change: The Stern Review*. Cambridge, England: Cambridge University Press.
- Tegova, S. (2010). *Application of the theory of planned behaviour to career choice: The role of an improved measure of emotion*. (Unpublished honours thesis). Edith Cowan University, Joondalup, Western Australia.
- The Ultimate Climate Change FQA. (2012). Retrieved from The Guardian Website:
<http://www.guardian.co.uk/environment/2011/apr/28/industries-sectors-carbon-emissions>
- Trainer, F. E. (1997). The global sustainability crisis: the implications for community. *International Journal of Social Economics*, 24(11), 1219-1240.
- Vaitheeswaran, V. V. (2003). *Power to the people, Farrarer*. New York, NY: Straus and Giroux.
- Van Ryn, M., & Vinokur, A. D. (1990). *The role of experimentally manipulated self-efficacy in determining job-search behaviour among the unemployed*. (Unpublished manuscript). Institute for Social Research, University of Michigan, Ann Arbor.

- Walker, Jamie. (2012). Campbell Newman to slash solar subsidies. Retrieved from The Australian Website:
<http://www.theaustralian.com.au/national-affairs/state-politics/campbell-newman-to-slash-solar-subsidies/story-e6frgczx-1226408340556>
- Water Corporation. (2012). Sprinklers and outdoor water use. Retrieved from the Water Corporation Website:
http://www.watercorporation.com.au/R/restrictions_index.cfm
- Wandel, M., & Bugge, A. (1997). Environmental concern in consumer evaluation of food quality. *Food Quality and Preference*, 8, 19–26.
- Weyant, J. P. (2011). Accelerating the development and diffusion of new energy technologies: Beyond the “valley of death”. *Energy Economics*, 33 (4), 674–682.
- What is The Carbon Tax? (2012). Retrieved from the Carbon Tax Website:
<http://www.carbontax.net.au/category/what-is-the-carbon-tax/>

Appendix A

Definitions of Terms

- **Theory of Planned Behaviour (TPB):** A model used to identify what impacts upon intention to perform a behaviour.
- **Gigawatts (GwH):** A unit of power that contains one billion watts.
- **Parts Per Million (PPM):** A way to express very diluted concentrations of substances.
- **Intergovernmental Panel on Climate Change (IPCC):** A body assesses the scientific, technical and socio-economic information relevant for the understanding of the risk of human-induced climate change.
- **Ice Core samples:** Ice core samples are a record of historical temperatures and rainfall over time by containing different gases and minerals.
- **Glacier:** A slow moving body of ice form over many years.
- **Ice Sheets:** A broad, thick sheet of ice covering a large area.
- **Carbon Dioxide:** A gas produced from the burning of fossil fuels.
- **Global Warming:** An average increase of the earth's atmospheric temperature.
- **Climate Change:** A long term change of the earth's climate.
- **Industrial Revolution:** Began around the 1760's in England that revolutionised mass production.
- **Greenhouse Gases (GHG):** A combination of many gases that include carbon dioxide, methane and nitrous oxide that absorbs solar radiation in the atmosphere which warms the planet.
- **Methane:** The most abundant organic compound that is the main component of natural gas.
- **Nitrous oxide:** Most commonly used as an aesthetic by surgeons and dentists.

- **Fossil fuels:** Derived from ancient plants and animals. Such fuels comprise of oil, coal and gas.
- **Renewable Energy:** Energy source that is produced from natural elements that have a low impact on the environment.
- **Non-Renewable Energy:** Energy source that can only use materials once and also produces carbon dioxide.
- **Carbon Emissions:** A gas that is a bi-product of burning fossil fuels.
- **Low Carbon Economy:** An economy producing low levels of carbon dioxide.
- **Wind Energy:** Wind producing electricity by turning the blades of a turbine.
- **Solar Energy:** Sun producing electricity by creating a chemical reaction inside solar panels.
- **Hydro Energy:** Water producing electricity by turning turbines usually found in dams.
- **Geothermal Energy:** Hot air escaping from fractures in the earth that produces electricity by turning blades of a turbine.
- **Bio-mass Energy:** The burning of plants or animal produces that produce electricity through turbines.
- **Tidal Energy:** The tidal power of the ocean that turns turbines producing electricity.
- **Bagasse:** left over fiber from sugarcane stalks.
- **Photovoltaic Solar Panels:** A method of generating electrical power by converting solar radiation into direct current electricity using semiconductors.
- **International Energy Agency (IEA):** An organisation incorporating 28 countries which focus on: energy security, economic development, environmental awareness, and engagement worldwide.
- **Megawatt (MwH):** A unit of power that contains a million watts.

- ***European Union (EU)***: A body created in 1993 to encourage political and economic integration.
- ***SPSS***: A program from IBM that is used to transform data into information.

Appendix B



Energy Resource Survey

We would appreciate if you could take a few minutes of your valuable time to complete this questionnaire. This is an anonymous questionnaire. You should read the Information

Letter carefully as it explains fully the intention of the research project. Please ensure that you do not write your name (or any other comments that could identify you) on the questionnaire. By completing the questionnaire, you are consenting to take part in this research.

1. Would you consider purchasing environmentally friendly items that are more expensive than conventional items?

Yes

No

If YES, how much extra are you willing to pay if the conventional product is worth \$10?

\$1 - \$3

\$4 - \$6

\$7 - \$9

\$10+

In your opinion rate the following sources of electricity in terms of environmental impact.

(Please circle the number you feel is most appropriate)

	Negative impact			No impact		
	1	2	3	4	5	6
Nuclear	1	2	3	4	5	6
Coal	1	2	3	4	5	6
Natural Gas	1	2	3	4	5	6
Oil	1	2	3	4	5	6
Large scale Hydro power (water)	1	2	3	4	5	6
Micro-hydro power (water)	1	2	3	4	5	6
Wind	1	2	3	4	5	6
Solar	1	2	3	4	5	6
Thermal	1	2	3	4	5	6
Tidal (ocean)	1	2	3	4	5	6
Bio-energy	1	2	3	4	5	6

Have you opted to purchase 'Green' (does not produce carbon emissions) energy from Synergy?

Yes

No

If NO, would you consider purchasing 'Green' energy from Synergy in the future?

Highly unlikely Unlikely Somewhat unlikely Somewhat likely Likely Highly likely

If you indicated that you would likely buy 'Green' energy, please indicate how much extra per month you are prepared to pay against your current electricity bill?

0% extra 25% extra 50% extra 75% extra 100% extra

Do you agree that your purchase of solar panels will make a difference to the environment?

Strongly disagree Disagree Somewhat disagree Agree Somewhat agree Strongly agree

The following items aim to determine **your beliefs** in relation to issues concerning energy consumption. Please indicate how strongly you agree or disagree with the following statements.

(Please circle the number you feel is most appropriate)

	Strongly disagree ▼					Strongly agree ▼
I think the government should let industry decide how best to supply energy	1	2	3	4	5	6
In my opinion a significant amount of energy is wasted by Western Australians over heating/cooling their homes	1	2	3	4	5	6
My energy habits are pretty much fixed and I do not think I could conserve much	1	2	3	4	5	6
Energy conservation at home would lead to a worsening of my quality of life	1	2	3	4	5	6
I think even if everyone tried to conserve energy at home, it wouldn't make a big impact on energy use in Australia	1	2	3	4	5	6
I believe it is everyone's right to use as much energy as they pay for	1	2	3	4	5	6
I am concerned about global warming effecting further generations of Australians	1	2	3	4	5	6
Personally I think the government should legislate the minimum amount of energy from green sources (eg, 5% wind/solar) for all companies that sell electricity	1	2	3	4	5	6
I think that everyone has a social responsibility to conserve energy	1	2	3	4	5	6
My energy use habits at home would change noticeably if energy prices increased 40%	1	2	3	4	5	6
I believe the environmental problems are exaggerated by environmentalists	1	2	3	4	5	6
In my opinion the South West should build more renewable energy sites so that we can reduce our dependence on coal power stations during the day	1	2	3	4	5	6
The Government carbon tax is a good thing and I support it	1	2	3	4	5	6
I feel that reducing an individual's carbon footprint is a good thing	1	2	3	4	5	6
I think if everyone buys solar panels there will be a reduction in carbon emissions	1	2	3	4	5	6
I think that individuals purchasing solar panels is not enough to make a real change	1	2	3	4	5	6
Personally I feel that the WA Government needs to do more in terms of renewable energy production	1	2	3	4	5	6
I think that the power and mining industries produce a lot of carbon emissions therefore, they need to be better controlled by the government	1	2	3	4	5	6
I don't believe in climate change, so purchasing solar panels will not make a difference	1	2	3	4	5	6

The following items aim to understand if **social factors** play a part in your decision process. To what extent do you agree or disagree with the following statements.

(Please <u>circle</u> the number you feel is most appropriate)	Strongly disagree					Strongly agree
	1	2	3	4	5	6
Climate change will be a very serious problem for me and my family	1	2	3	4	5	6
I think that climate change will be a very serious problem for Australia	1	2	3	4	5	6
I think climate change will be a problem for other species of plants/animals	1	2	3	4	5	6
I feel a personal obligation to do whatever I can to prevent climate change	1	2	3	4	5	6
I believe business and industry should reduce their emissions to help prevent climate change	1	2	3	4	5	6
I am happy to pay the carbon tax to protect the environment	1	2	3	4	5	6
I would be willing to accept cuts in my standard of living to protect the environment	1	2	3	4	5	6
I would be willing to pay 5% more on everything to protect the environment	1	2	3	4	5	6
Those closest to me expect me to use 'Green' energy	1	2	3	4	5	6
I expect my closest friends/family to use 'Green' energy	1	2	3	4	5	6
I would consider solar panels if the majority of my neighbourhood used this energy	1	2	3	4	5	6
My social circle encourages me to use environmentally friendly products	1	2	3	4	5	6
Those closest to me influence my behaviour and how I impact the environment	1	2	3	4	5	6
It is important for me to be seen as contributing to environmental conservation	1	2	3	4	5	6
It is important to me that those closest are contributing to environmental preservation	1	2	3	4	5	6
Advertising campaigns related to solar panels positively reinforce my attitude toward this technology	1	2	3	4	5	6

The following items aim to determine what **influences** you to improve the energy efficiency of your home. To what extent do you agree or disagree with the following statements.

(Please <u>circle</u> the number you feel is most appropriate)	Strongly disagree					Strongly agree
	1	2	3	4	5	6
Having too many other things to do would prevent me from adopting solar panels	1	2	3	4	5	6
Because of daily hassles I forget such things, and this would prevent me from purchasing solar panels	1	2	3	4	5	6
The effort to find information and begin the process would prevent me from purchasing solar panels	1	2	3	4	5	6
My motivation is low, and this would prevent me from purchasing solar panels	1	2	3	4	5	6
Solar panels are too expensive, and this would prevent me from purchasing	1	2	3	4	5	6
It would be easy for me to purchase solar panels	1	2	3	4	5	6
The government does not provide enough incentives for me to purchase solar energy	1	2	3	4	5	6
I do not have sufficient funds to purchase solar panels	1	2	3	4	5	6
I believe it is not worth investing in solar panels	1	2	3	4	5	6
I think that solar panels look unattractive	1	2	3	4	5	6
I believe that it will take too long for the system to pay itself off	1	2	3	4	5	6
I won't be living in the house long enough to gain any benefit	1	2	3	4	5	6

The following questions investigate **your intentions** of purchasing solar panels in the future? Please indicate how strongly you agree or disagree with the following statements.

(Please circle the number you feel is most appropriate)

	Strongly disagree				Strongly agree	
	1	2	3	4	5	6
I intend to purchase solar panels because of my environmental concerns	1	2	3	4	5	6
I intend to purchase solar panels because of the financial benefits it will return	1	2	3	4	5	6
Solar panels are an environmentally friendly energy source, therefore I intend to purchase them in the future	1	2	3	4	5	6
Current government subsidies will encourage me to purchase solar panels	1	2	3	4	5	6
I intend to purchase solar panels as a alternative source of energy	1	2	3	4	5	6
I intend to purchase solar panels as it will reduce my overall energy bill	1	2	3	4	5	6
I would consider buying solar panels above other sources of energy	1	2	3	4	5	6

In your opinion, how should the start-up costs of building 'Green' electricity sources be paid for? Please indicate how strongly you agree or disagree with the following statements.

(Please circle the number you feel is most appropriate)

	Strongly disagree				Strongly agree	
	1	2	3	4	5	6
The government should subsidise power generation from 'Green' sources	1	2	3	4	5	6
Everyone should contribute through slightly higher electricity rates	1	2	3	4	5	6
Only those people who want 'Green' electricity should pay more for it	1	2	3	4	5	6
'Green' power should not be built if it costs more than conventional sources	1	2	3	4	5	6
Other (please specify): _____						

Have you retro-fitted your home with other products to make it more energy efficient?

Yes (Please continue below)

No

If YES, please indicate the types of energy efficient changes you have made.

(Please tick ALL that apply)

Roof insulation

Double-glazed windows

Awnings

LED light

Wall insulation

Full block-out blinds/curtains

Airtight door/window seals

Smart m

Other (please specify): _____

To finish off, we would like to ask you the following questions about yourself. This information will be used for classification purposes and to help us understand the various views of different user groups.

12. How many years have you lived in your current home?

0 – 4 years

15 – 19 years

5 – 9 years

More than 20 years

10 – 14 years

13. How old is your current house?

- | | |
|--|---|
| <input type="checkbox"/> 0 – 4 years | <input type="checkbox"/> 25 – 29 years |
| <input type="checkbox"/> 5 – 9 years | <input type="checkbox"/> 30 – 34 years |
| <input type="checkbox"/> 10 – 14 years | <input type="checkbox"/> 35 – 39 years |
| <input type="checkbox"/> 15 – 19 years | <input type="checkbox"/> More than 40 years |
| <input type="checkbox"/> 20 – 24 years | |

14. What material is the external infrastructure of your house predominantly made of?

- | | |
|--|---------------------------------------|
| <input type="checkbox"/> Brick | <input type="checkbox"/> Timber |
| <input type="checkbox"/> Weatherboard | <input type="checkbox"/> Fibro-cement |
| <input type="checkbox"/> Stone/Masonry | <input type="checkbox"/> Rammed earth |
| <input type="checkbox"/> Other: _____ | |

15. How long do you intend to stay in your current home?

- | | |
|--|---|
| <input type="checkbox"/> 0 – 4 years | <input type="checkbox"/> 15 – 19 years |
| <input type="checkbox"/> 5 – 9 years | <input type="checkbox"/> More than 20 years |
| <input type="checkbox"/> 10 – 14 years | |

16. Will you build or buy a new home, or renovate your existing one, in the next two years?

- No plans
- Probably buy an established house
- Probably build a new home (custom-made)
- Probably build a new home (house and land package)
- Probably buy a new or existing flat/apartment
- Major renovations including kitchen and/or bathroom
- Other renovations not including kitchen and/or bathroom

17. Please indicate the Local Government Shire of which you live.

- | | |
|---|--|
| <input type="checkbox"/> Augusta-Margaret River | <input type="checkbox"/> Collie |
| <input type="checkbox"/> Boyup Brook | <input type="checkbox"/> Dardanup |
| <input type="checkbox"/> Bridgetown-Greenbushes | <input type="checkbox"/> Donnybrook-Balingup |
| <input type="checkbox"/> Bunbury | <input type="checkbox"/> Harvey |
| <input type="checkbox"/> Busselton | <input type="checkbox"/> Manjimup |
| <input type="checkbox"/> Capel | <input type="checkbox"/> Nannup |

18. Please state your town/suburb and postcode of residence?

Town/Suburb: _____

Postcode: _____

19. Please specify your gender.

- Male Female

20. What is your current age?

- | | |
|----------------------------------|----------------------------------|
| <input type="checkbox"/> 18 – 24 | <input type="checkbox"/> 45 – 54 |
| <input type="checkbox"/> 25 – 34 | <input type="checkbox"/> 55 – 64 |
| <input type="checkbox"/> 35 – 44 | <input type="checkbox"/> 65 over |

21. Please indicate your yearly household income after tax?

- | | |
|--|--|
| <input type="checkbox"/> \$0 - \$49,999 | <input type="checkbox"/> \$200,000 - \$249,999 |
| <input type="checkbox"/> \$50,000 - \$99,999 | <input type="checkbox"/> \$250,000 - \$299,999 |
| <input type="checkbox"/> \$100,000 - \$149,999 | <input type="checkbox"/> \$300,000+ |
| <input type="checkbox"/> \$150,000 - \$199,999 | |

22. Is your home ...

- Currently being paid off Fully owned

23. How many people in total live in your house?

- | | |
|------------------------------------|--|
| <input type="checkbox"/> 1 person | <input type="checkbox"/> 5 persons |
| <input type="checkbox"/> 2 persons | <input type="checkbox"/> 6 persons |
| <input type="checkbox"/> 3 persons | <input type="checkbox"/> 7 persons |
| <input type="checkbox"/> 4 persons | <input type="checkbox"/> 8 or more persons |

24. Please indicate the highest education level held within your household?

- | | |
|--|---|
| <input type="checkbox"/> High School Certificate | <input type="checkbox"/> Undergraduate Degree |
| <input type="checkbox"/> TAFE Certificate | <input type="checkbox"/> Postgraduate Degree |
| <input type="checkbox"/> Diploma | <input type="checkbox"/> Doctorate |
| <input type="checkbox"/> Other: _____ | |

25. Please indicate the occupation(s) of the main decision-maker(s) in your household?

Person 1: _____

Person 2: _____

Person 3: _____

Thank you for your participation

PARTICIPANT INFORMATION LETTER

What are the attitudinal and behavioural factors influencing the adoption of residential solar panels of rural south western consumers of Western Australia?

You are invited to participate in this research project because you have a home in the south west region of Western Australia. I am conducting this research as part of my Honours degree and as such the research is supported by the Faculty of Business and Law at Edith Cowan University. The project has also received Ethics clearance by The Faculty of Business and Law Ethics Sub-Committee.

The research project will investigate the attitudinal and behavioural factors that influencing the adoption of residential solar panels of south western consumers of Western Australia. I am seeking the views of local people around the issues of solar panel purchase.

The data collected will be used to complete the requirements of my Honours degree. Any information or details given for this study will be kept confidential and will only be used for the purposes of this project. You will not be identified in any written report or presentation of the results of this research. Any presentations, reports, journal papers or the thesis that result from this research will be made available to you at your request. All documents will be securely stored for 5 years after the submission of the thesis and then destroyed.

Participation in this project is voluntary. If you choose to participate, you are free to withdraw at any time without giving a reason and with no negative consequences.

If you have any questions or concerns about the research project, please contact:

Research Ethics Officer
Phone: (08) 6304 2170
Email: research.ethics@ecu.edu.au

Thank you for your participation, it is greatly appreciated.

Greg

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Appendix D

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df1	df2	Sig. F Change
1	.203 ^a	.041	.039	1.181	.041	14.338	1	332	.000
2	.599 ^b	.359	.351	.970	.318	54.377	3	329	.000

a. Predictors: (Constant), Current age

b. Predictors: (Constant), Current age, Control, Normative, Behavioural

c. Dependent Variable: Intention

ANOVA

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	129.911	2	64.956	60.789	.000 ^a
	Residual	355.827	333	1.069		
	Total	485.738	335			

a. Predictors: (Constant), Normative_Global, Normative_Social

b. Dependent Variable: Intention

Coefficients^a

Model		Unstandardized Coefficients		Standardized	t	Sig.	95.0% Confidence Interval for B		Correlations		
		B	Std. Error	Beta			Lower Bound	Upper Bound	Zero-order	Partial	Part
		1	(Constant)	4.309			.178		24.255	.000	3.959
	Current age	-.179	.047	-.203	-3.787	.000	-.271	-.086	-.203	-.203	-.203
2	(Constant)	2.919	.481		6.075	.000	1.974	3.865			
	Current age	-.137	.039	-.156	-3.511	.001	-.214	-.060	-.203	-.190	-.155
	Behavioural	.236	.107	.142	2.202	.028	.025	.447	.464	.120	.097
	Normative	.416	.078	.344	5.319	.000	.262	.569	.517	.281	.235
	Control	-.379	.073	-.238	-5.218	.000	-.522	-.236	-.352	-.276	-.230

a. Dependent Variable: Intention

Appendix E

KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy	0.922
Bartlett's Test of Sphericity Approx. Chi-Square	3685.781
df	120
Sig.	0

Communalities

	Initial	Extraction
Climate change will be a big problem for me and my family	.71	0.67
Climate change will be a big problem for Australia	.85	0.85
Climate change will be a big problem for other species of plants/animals	.78	0.75
Personal obligation to do whatever one can to prevent climate change	.63	0.63
Businesses and industries should reduce carbon emissions to prevent climate change	.59	0.57
Happy to pay the Carbon Tax to protect the environment	.58	0.50
Cuts in the standard of living to protect the environment	.59	0.51
Willing to pay 5% more on everything to protect the environment	.57	0.46
Those closest to me expect me to use 'Green' energy	.67	0.54
I expect my closest friends/family to use 'Green' energy	.71	0.62
I will consider solar panels if the majority of the neighbourhood used this energy	.38	0.40
My social circle encourages me to use environmentally friendly produces	.53	0.56
Those closest to me influence my behaviour and how I impact the environment	.39	0.39

I want to be seen as contributing to environmental conservation	.68	0.64
I want those closest to me to contribute to environmental preservation	.68	0.63
Advertising campaigns related to solar panels positively reinforce my attitude toward this technology	.44	0.45

Extraction Method: Principal Component Analysis.

Total Variance Explained

Factor	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings ^a
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total
1	8.18	51.14	51.14	7.77	48.59	48.59	6.55
2	1.78	11.13	62.27	1.40	8.72	57.30	6.65
3	0.93	5.79	68.06				

Extraction Method: Principal Component Analysis.

a. When components are correlated, sums of squared loadings cannot be added to obtain a total variance.

Pattern Matrix

	Component	
	1	2
My social circle encourages me to use environmentally friendly produces	.788	
I want those closest to me to contribute to environmental preservation	.736	
I want to be seen as contributing to environmental conservation	.732	
I expect my closest friends/family to use 'Green' energy	.727	
Those closest to me influence my behaviour and how I impact the environment	.676	
Those closest to me expect me to use 'Green' energy	.674	
I will consider solar panels if the majority of the neighbourhood used this energy	.649	
Advertising campaigns related to solar panels positively reinforce my attitude toward this technology	.614	
Climate change will be a big problem for Australia		-1.005
Climate change will be a big problem for other species of plants/animals		-.943
Climate change will be a big problem for me and my family		-.781
Businesses and industries should reduce carbon emissions to prevent climate change		-.744
Personal obligation to do whatever one can to prevent climate change		-.675
Cuts in the standard of living to protect the environment		-.558
Happy to pay the Carbon Tax to protect the environment		-.498
Willing to pay 5% more on everything to protect the environment		-.485

Extraction Method: Principal Component Analysis.
 Rotation Method: Oblimin with Kaiser Normalization.
 a. Rotation converged in 8 iterations.

Factor Correlation Matrix

Factor	1	2
1	1.000	-.633
2	-.633	1.000

Extraction Method: Principal Axis Factoring.
 Rotation Method: Oblimin with Kaiser Normalization.

Appendix F

Model Summary^b

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df1	df2	Sig. F Change
1	.517 ^a	.267	.263	1.03371	.267	60.789	2	333	.000

a. Predictors: (Constant), Normative_Global, Normative_Social

b. Dependent Variable: Intention

ANOVA^b

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	129.911	2	64.956	60.789	.000 ^a
	Residual	355.827	333	1.069		
	Total	485.738	335			

a. Predictors: (Constant), Normative_Global, Normative_Social

b. Dependent Variable: Intention

Coefficients^a

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.	95.0% Confidence Interval for B		Correlations			
	B	Std. Error	Beta			Lower Bound	Upper Bound	Zero-order	Partial	Part	
	1	(Constant)	1.534			.208		7.376	.000	1.125	1.943
	Normative_Social	.355	.072	.309	4.959	.000	.214	.496	.479	.262	.233
	Normative_Global	.274	.066	.258	4.148	.000	.144	.404	.462	.222	.195

a. Dependent Variable: Intention