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Tensions in implementing the “energy-conservation/carbon-reduction” policy in Taiwanese culture

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本研究的目標在探討民眾所知覺到的節能減碳政策與傳統文化實踐間的張力。來自不同性別、年齡、居住地區與職業的 94 位民眾參與本研究半結構式問題的訪談，訪談問題主要在了解研究參與者對節能減碳與傳統文化所知覺到的構念、信念、行為與張力。研究資料採質性研究分析方法，依開放編碼、主題找尋、持續比較、理論產生等四個程序進行。分析結果產生四個主題：(1)節能與減碳間知識基礎的張力，(2)擁有與存有間生活風格的張力、(3)權威與順從間社會系統的張力、(4)科技與自然間創造界限的張力。解決此四張力的方式包括：堅實的知識、實用的理想主義、階層式的協同合作、永續的創新。

關鍵字：減碳、節能、能源政策、民眾知覺

The aim of the study is to investigate tensions between the implementation of the energy-conservation/carbon-reduction policy and the practice of traditional culture perceived by the public. The research participants are 94 people living in Taiwan, selected by balancing sexes, ages, and residential areas, from a wide range of vocations. The research data are collected by semi-structure interview with the participants individually. Interview questions are designed to elicit participants’ perceived constructs, beliefs, behaviours, and tensions in relation to energy-conservation/carbon-reduction and traditional culture. Data analysis is performed based on a qualitative methodology by the procedure of open coding, theme finding, constant comparison, and theory generation. Four themes are identified: (1) tensions in knowledge bases between energy conservation and carbon reduction, (2) tensions in life styles between having and being, (3) tensions in social systems between authority and conformity, and (4) tensions in creation boundary between technology and nature. Solutions to the four tensions may include solid knowledge, pragmatic idealism, hierarchical collaboration, and sustainable innovation.

Keywords*:* carbon reduction; energy conservation; energy policy; public perception

1. Introduction

Anthropogenic greenhouse gas concentrations at the global scale appear to play one of the most important roles in the increase of global average temperature (Intergovernmental Panel on Climate Change, 2010). This has increased the likelihood of extreme climate change and natural hazard in most places of the world, including Taiwan. The devastating earthquake of September 21st, 1999, and the typhoon on August 8th in 2009 that caused mudflows, landslides, and huge casualties are but a few examples; the frequency of small-scale natural hazard is also increasing in Taiwan. Technology alone is not enough to reverse this negative trend partly because the development of advanced technology needs time. Social change in people's life styles for the reduction of energy use, on the other hand, appears to be a more reasonable, economical, and valid way, but it may also raise tensions between technology and socio-cultural effectiveness, e.g., vehicle use (Moriarty & Honnery, 2008).

In order to mitigate greenhouse gas, global warming, and natural hazard, "energy-conservation/carbon-reduction" has become one of the major policies of the government in Taiwan. The energy policy was formally introduced by the *Sustainable Energy Policy Guidelines* in 2008. Energy education for all has also become one of the major measures to implement energy-conservation/carbon-reduction, as shown by the *Environmental Education Act* launched by the Taiwanese government in 2010. Despite the policy advocated by the government and the ambition to implement the policy into the public, there remain tensions between the implementation of the policy and the practice of traditional culture in the society. For this, Taiwan is also not an exception from the phenomenon that is widely occurring in diverse cultures in the world, as indicated by the literature to be reviewed later.

The purpose of this study, therefore, is to understand the tensions in implementing the "energy-conservation/carbon-reduction" policy in Taiwan based on a psycho-socio-cultural approach using qualitative methodology (Keirstead, 2006; West, Bailey, & Winter, 2010). Based on an in-depth understanding of the public's views, we are likely to identify barriers and facilitators for the implementation of an energy policy, which are strongly posited by experts in sciences, economics, and technology. Qualitative methodology is used in this study as it excels in finding and understanding the meanings constructed by people in human-environment interactions. The participants in this study were interviewed in the second half year of 2010, just around 1.5 year after the energy policy was formally launched in 2008. This will provide valuable historical document as to how humans respond to a "new" policy, which may tremendously influence their lives.

1.1. Models of Energy Policy in the Socio-Cultural Context

"Energy-conservation/carbon-reduction" appears to be a policy or behaviour advocated by different cultures especially in the world campaign against global warming. Theorists, however, have indicated that it is not just a technical or economic issue but also a people issue (Yates & Aronson, 1983). The policy requires people to take actions or to change behaviours that have been deeply embedded in people's daily lives and their cultures.

Keirstead (2006) in the UK integrates the variables researched by past relevant studies on energy policy in four major disciplines (engineering, economics, psychology, and sociology/anthropology) and posits an agent-based integrated

framework for domestic energy consumption. The external systems (from government, market, society, and house) impacts on the internal household systems (e.g., socio-economic status, budgets, and purchase and use behaviours), which in turn influence energy consumption behaviours. He believes that socio-cultural factors such as cultural values and behavioural interactions with technologies, in other words, "people" are the major missing variable in the previous models of domestic energy consumption, which normally focus on technologies or costs.

Weber and Perrels (2000, p. 550) posit a model highlighting this issue by a four-stage diagram: (1) The societal hyper-structure (tensions occurring between the availability and physical infrastructure in technology and the societal/cultural values, norms, and climate in lifestyle) serves as the pre-determined factor in (2) manifest lifestyle (individual differences in money/time spending patterns, priority settings, and habit formations). The manifest lifestyle in turn influences (3) energy use (tensions occurring again between the equipment efficacy and maintenance in technology and the purchase, frequency-of-use, and accuracy-of-use behaviour in lifestyle) and creates (4) environmental impacts on climate change (acidification, air pollution, land use and soil degradation, waste problems, and bio-diversity). The model focuses on the issue of explicit tensions between technology and lifestyle from an economic perspective. The results of their further simulation study for West Germany, France and the Netherlands indicate that sustainable technology and reflective consumption appear to be better solutions to reducing greenhouse gas emission without risking economic development than social stagnation in inequality and business growth in equality. Their study has contributed significantly to the identification of likely differential evolutions based on differential tensions between lifestyle and technology. The in-depth meaning underlying these tensions, however, is still not unveiled. The meaning of the pre-determined factor "societal infrastructure" in their model is still not addressed.

The above two models provide a comprehensive framework for addressing the issue of implementing energy policies and mirror some other relevant models based on multi- or trans-disciplinary perspectives (Faiers, Cook, & Neame, 2007; Jackson, 2005). We, however, still need more culture-specific models by identifying more socio-cultural factors in order to improve the understanding of effective implementation of energy policies, which actually are cultivated by different societies.

1.2. Tensions in Implementing Energy Policies in Diverse Cultures

The intended energy policy posited by the government is not necessarily put into daily practice. Viklund (2004) in Sweden finds a weak relationship between attitudes towards electricity saving and electricity saving behaviours. Perceived risk, on the other hand, is a significant predictor of pro-environmental attitude and electricity saving, which suggests that psychological knowledge in energy policy implementation needs to be elaborated to increase people's willingness to take action. Effective factors can also be identified through observation of daily practices to inform useful knowledge for energy policy.

Anue (2007) in Norway finds that the right view does not necessarily generate right energy saving behaviour and culture plays an important role in the behaviour. She observes that energy saving is not people's concern with Norwegians viewing home as a heaven, project, and arena for activities. In China, misconception in using warm water in the use of washing machines appears to increase more energy use (Lin & Iyer, 2007).

Technology use for cost saving appears to be an effective measure, as indicated by Goldblatt, Hartmann, & Dürrenberger (2005) in Swiss and Humbad and Babu (2009) in India. Interaction among tradition, culture, new technology use, and policy may still be taken into account when introducing new technology into home and working places in a culture. Otherwise, the gap between policy implementation and actual behaviours still remains (Raven, 2004).

In the US, the major issue in energy policy is car use. Misconception in motor vehicle idling may need to be amended (Carrico, Padgett, Vandenbergh, Gilligan, & Wallston, 2009). Social change in life style and land use needs to be initiated by the government and the US people if change is expected in the future (Rajan, 2006).

Community is also a major vehicle to implement energy policy. However, culture specificity appears to be a major factor in determining the success of a campaign for energy saving. However, one campaign successfully implemented in a specific community is not necessarily transferrable to another community (Heiskanen, Johnson, Robinson, Vadovics, & Saastamoinene, 2009; Peters, Fudge, & Sinclair, 2010).

1.3. The "Energy-Conservation/Carbon-Reduction" Policy in Taiwan

In response to global climate change, the policy, "energy-conservation/carbon-reduction," is formally launched in the *Sustainable Energy Policy Guidelines* by the government in Taiwan in 2008. The *Guidelines* sets the objectives to return to the emission level of 2008 during 2016 ~ 2020, to the emission level of 2000 in 2025, and to the world standard, 50% of the emission level of 2000 in 2050. Two strands of related measures are taken to aim for a "low carbon society." The first strand focuses on the government and all the government funding bodies through the measures of decrees and punishment. The electricity and oil use of all government funding bodies has to maintain a negative growth rate each year. Staff, teachers, and students of the bodies have to attend at least four hours of environmental education each year, according to the *Environmental Education Act* launched in 2010. These bodies will be fined if these orders were violated. The second strand focuses on the general people and private companies through campaigns and incentives. Related campaigns, e.g., "green hotel competition," "I love green-label products," and "sign the energy-conservation/carbon-reduction declarations" are carried out to educate and encourage the general public and industries to use and create green products. Most of the campaigns are organized by the Environmental Protection Administration of Executive Yuan in Taiwan and presented on its website (www.epa.gov.tw). Academics are also funded to conduct research on green products and energy education by the government.

The *Guidelines* has set a high objective, but the measures to achieve the aim appear to be weak, punishing the public sector and encouraging the private sector. No wonder, Liu, Liou, Yeh, and Shang (2009) indicate that the far-reaching objectives are unlikely to be fulfilled. They suggest target-aimed strategy may be more effective in addressing the issue of reducing greenhouse gas in Taipei City, Taiwan.

The above review of literature suggests potential tensions in the society underlying the implementation of any energy policy, though highly supported by the government. This study aims to answer the following two research questions.

(1) What are the tensions in implementing the "energy-conservation/carbon-reduction" policy in Taiwan?

(2) What are the likely solutions to the tensions in implementing the energy policy?

2. Method

2.1. Participants

The research participants were 94 people living in Taiwan. They were selected by balancing sexes (48 females), ages (10 and above), and residential areas (in the Taiwan main island). They were from a wide range of vocations, including bank clerks, builders, computer programmers, dealers, designers, engineers, constructors, counsellors, farmers, house-husbands/wives, media workers, medical doctors, officials, religious workers, soldiers, students, teachers, the retired and unemployed, transportation service workers, writers, etc.

2.1. Data collection

The research data were collected by semi-structure interview with the research participants individually. The interviews were firstly conducted by a senior researcher as a pilot study, by which interview questions suitable for the wide range of research participants were gradually established. Then, five junior researchers were trained to interview the other participants. The participants' responses were explored in depth based on their responses to the interview questions until the meaning they communicated were fully clarified. Most interviews lasted around one hour (20 min. to 1 hr 34 min). The five interview questions are as follows.

1. What is "energy-conservation/carbon-reduction" as far as you understand? What are your concerns about this? How important is this?
2. What is "traditional culture" as far as you understand? What are your concerns about this? How important is this?
3. What are the relationships between energy-conservation/carbon-reduction and traditional culture? Are there any stories or experiences that remind you of their relationships?
4. Will energy-conservation/carbon-reduction be facilitators/barriers to traditional culture or vice versa? What are your specific experiences or examples that can further explain your opinions, e.g., in the aspects of food, purchase, house, travel, and jobs?
5. What are potential good ways (including experiences from other countries) to implement energy-conservation/carbon-reduction?

2.2. Data analysis

The interviews were conducted in Chinese although some participants spontaneously used Taiwanese local languages occasionally. All of the interviews were audio-recorded and fully transcribed. The verbatim transcripts of the interviews were analyzed by the methodologies of general qualitative data analysis (Miles & Huberman, 1994), phenomenography (Marton, 1981), and grounded theory (Charmaz, 2000; Strauss & Corbin, 1990, 1998). The procedures included open coding, theme finding, constant comparison, and theory generation. The transcripts were read, keywords were identified, and similar keywords were grouped into lower-order themes. Then, the lower-order themes were organized into higher-order themes, based

on the meaning of the lower-order themes and the juxtaposition of them in the transcripts. Finally, all the themes were re-structured to generate suitable "theories" to answer the research questions.

3. Results

People generally had rational, cognitive, and knowledgeable responses to the implementation of energy-conservation/carbon-reduction at first glance. The seemingly rational responses, however, turned into emotional ones when tensions occurred in the aspects of knowledge bases, social systems, life styles, and cultural artifacts. Figure 1 summarizes findings by a posited model of tensions in implementing an energy policy in a culture.

3.1. Tension in knowledge bases between energy conservation and carbon reduction

Knowledge in cognition. Energy conservation and carbon reduction are placed together as an action slogan/policy perhaps because they are scientifically linked together: We use energy and we produce carbon/greenhouse-gas emission at the same time, which plays an important role in global warming. Scientists, educators, or policy-makers may expect the two values/valences in the same direction to generate more knowledge power to justify the implementation of energy-conservation/carbon-reduction, i.e., "energy (+1) + carbon (+1) = +2." People's cognitive rationales for energy-conservation/carbon-reduction appear to fit this expectation.

- *Energy-conservation/carbon-reduction is about saving energy and reducing carbon dioxide because there's global warming now. If we don't do energy-conservation/carbon-reduction, the Earth may be destroyed and lots of animals and plants will be extinct. (Male, age 11, Grade 5 primary school student)*
- *It's impossible for energy to be unlimited. Not just energy, lots of things are… It's to protect the Earth. (Female, age 16, Grade 10 senior high school student)*

If we scrutinize in-depth, however, we may find that the rationales for energy conservation and those for carbon reduction appear to be slightly unlinked or distinctly separate. One may focus more on either the rationale for energy conservation or that for carbon reduction.

Knowledge in emotion. If we take the emotional aspect into account, we may find that scientists and economists create a positive image of energy (we need energy but we have few, so we should cherish it, e.g., oil as "black gold") and a negative image of carbon (we produce carbon, which may destroy all the people in the world, but the question is how can't we produce carbon because we are human beings as part of nature and culture). Cognitive confusion and uncertainty may explain the reasons why people doubt the need to implement energy-conservation/carbon-reduction, advocated by the government.

- *Energy-conservation/carbon-reduction is important, but in implementation, I feel it's too late in the current overall situation. Everybody may be able to do a small part, so some reduction can be made, but can you control the entire situation the*

Earth is in? You can't, and it's too late anyway, like icebergs, floods, and tsunami. If icebergs melt, there will be floods…I don't know any scientific ways!… I don't have any solutions. (Female, age 50s, library manager)

- *Taiwan is a country that depends more on foreign resources, so it sees energy conservation as a very important issue. But, where did the idea of carbon reduction come from? Did it go through thorough scientific testing? Is the testing method of 20 years ago really the same as the testing method now? Carbon is something that exists in nature, and it's very low in number… You will notice that many theories are shaky. (Male, age 30s, science R&D organization publicist)*

Knowledge in culture. Carbon reduction appears to have several conflicts with traditional cultural practices in Taiwan, while energy conservation appears to better fit the values, virtues, and practices advocated by its culture.

- *The government is trying to tell us not to burn the hay, isn't it very distressing? … It's very inconvenient to our work… Before, we collect the hay and burn it once they're dry when we tend to the farm, so all the insect eggs will be gone, then we don't need to use pesticides. That's good, right? (Male, age 60s, farmer)*
- *I feel that people in the past care more about cherishing hard work and what they have, so they feel more gratitude… If we cherish hard work, we will be more frugal and diligent; we can walk instead of drive, and we can ride bikes instead of motorcycles. (Female, age 50s, religious organization chief executive officer)*

The actual formula may become "energy (+1) + carbon (-.5) = .5 " when knowledge and related feelings (cognitive and affective states) are combined and put into practices and actions in the culture. The weak knowledge base and negative image of carbon reduction give people strong reasons against the action of energy-conservation/carbon-reduction especially when these actions obviously go against their original cultures or practices.

3.2. Tensions in life styles between having and being

Tensions may occur in life styles, which place more emphases on having money, comfort, and pride or on leading a healthy, environmental, simplistic and spiritual life.

Having money. Energy-conservation/carbon-reduction is usually not part of the agenda of the public's economic/vocational life.

- *Isn't energy-conservation/carbon-reduction promoting people to ride public transportation? Then how about us who drive cabs? If everybody rides the bus, nobody will ride in taxis! (Male, age 40s, taxi driver)*
- *The boss cares about building the house fast and selling it fast…The electricity bill is around five or six hundred thousand dollars every month, ten or twenty thousand dollars cheaper doesn't make a big difference to me… Sometimes nobody turns off the hose all day and there's water leakage all over the ground… Nobody cares about this energy waste. (Male, age 40s, senior engineer in construction industry)*

Having comfort or saving time. Sometimes people would like to use money (and energy) to trade for comfort or time.

- *In rush hours, there are so many people in the mass rapid transit in Taipei. Some people would choose to drive and sit inside their own cars even through traffic jams and then oil and money are spent….Actually, we all want to have comfort…Most people can do carbon-reduction if it is comfortable. (Female, age 17, senior high school student)*
- *I work in a tall building. I'll walk only if there's no elevator or when I am in good mood. (Male, age 30s, law officer)*

Saving face. Sometimes, we use "energy" (money) in order to establish our personal image of superiority.

- *Everybody loves driving; some people may think that driving is higher class. (Female, age 16, Grade 10 senior high school student)*
- *Elaborate worships, weddings… are big wastes, because some people just care a lot about face-saving. (Female, age 50s, religious organization chief executive officer)*
- *When people pass away, our culture gives us a serious tradition. There must be a solemn ceremony with extravagance and attended by many people. (Male, age 60s, furniture shop boss)*

Being healthy and environmental. People acknowledge the advantages of the Energy-conservation/carbon-reduction policy in promoting a better environment for living.

- *Energy-conservation/carbon-reduction is good to the overall environment for humans; at least it can reduce the problem of pollution in cities. (Male, age 30s, science R&D organization publicist)*
- *The oil industry fails to take care of environmental issues, only focusing on earning money…I don' want the money for compensation. I care about whether the gas emission from their factories is polluted. (Female, age 30s, bank clerk)*

Being simplistic and spiritual. The energy-conservation/carbon-reduction policy appears to fit human pursuit of spiritual, moral, and metaphysical lives.

- *Energy-conservation/carbon-reduction can make our culture not so snobbish. Everyone will go after a more simplistic, more frugal, and good life style. (Female, age 50s, housewife)*

3.2. Tensions in social systems between authority and conformity

People are sensitive to the hierarchical system in the society. There appears to be unbalanced relationships between the strong and the weak. The tensions in social systems between authority and conformity may occur at the cross-cultural, national, socioeconomic, religious, and group levels.

Cross-culture. People emphasize the role of Western and big countries in global warming.

- *For the last few centuries, there hasn't been any change in Earth. But if it starts*

to change, then it should not be related to our culture and tradition. It's the change in our living habits towards westernization. (Male, age 50s, medical doctor)

- *Even though we can take care of our actions, but the main source of carbon waste and energy use are big corporations. For example, America uses a lot of energy and creates lots of wastes. So the major countries, like America and Europe, can serve as examples and lead the way, and us, other people, can have something to compare to and to follow. (Female, age 20s, Year-4 undergraduate student)*

Nation. People appear to assume that the government should take the most responsibility in the war fighting against global warming at the national level.

- *All the government agencies have their air conditions on high. I think the government should reflect on themselves and stop telling the citizens to conserve energy and reduce carbon while they are all driving cars with more than 3000cc. Their actions contradict with their words. (Female, age 40s, English teacher in senior high school)*
- *I think there should be another bike lane… If you force it, there may be some conflict… But Taiwanese sometimes roll with the punches… They still submit to the so-called "government."(Male, age 20s, postgraduate student in social sciences)*

Socioeconomic status. The rich may become the centre of criticism in the movement towards energy-conservation/carbon-reduction.

- *Mansions… expensive things are about delicacy, luxury, and comfort, but regular houses care about green, and what saves you money… The people at the top of the pyramid* (i.e., the richest) *aren't affected by the others; they don't care about energy-conservation/carbon-reduction… They have so many cars. Isn't it all the same? (Male, age 40s, senior engineer in construction industry)*
- *We are promoting cremation now, but I hear that lots of government officials are still being buried. They are very superstitious about feng shui and take up a lot of land once they do it. (female, age 50s, religious organization chief executive officer)*

Religion. Religion, embedded in the traditional culture, plays an important role in some people's daily life. Religious leaders, therefore, may play a significant role in the movement of energy-conservation/carbon-reduction.

- *You can't live if you don't use firecrackers… You tell them to conserve energy and reduce carbon; tell them not to use firecrackers; that's impossible. I think it's not possible even after one hundred years… if there's a conflict, people will still side with religion. Religion is very important to Taiwanese… I feel that it wouldn't be effective if the government says it… Religious leaders may be of more help. (Female, age 40s, English teacher in senior high school)*

Group. The dominant figures in formal (e.g., companies) or informal groups (families) appear to lead the way.

- *You do not have the power to control, depending on your status and duty. Bosses say "Turn on the air conditioner." Dare you say "no" to them? (Male, age 40s, manager in construction industry)*
- *In traditional holidays, my mother always cook a lot…You cannot offend elders…You have to respect them. (Female, age 30s, bank clerk)*

3.4. Tensions in creation boundary between technology and nature

Human beings are mortal and only part of the world but also have the intelligence, ambition, and drive to create things and control the whole world. We aim to create artifacts to give us better living (e.g., cars) or to help us turn away from risks (e.g. measures to mitigate global warming). We, however, may be sometimes not aware of whether we are crossing the boundary of the law of nature.

Products/Technology. Some people are aware of the ambiguous nature of immature technology or goods productions to our environment and culture.

- *We are not quite sure whether pro-environmental goods are mature enough at their present stage of technical development or whether they can substitute their counterpart goods effectively. There is a gap. It's that green technique may not be able to fit green policy, rather than that green policy wants to destroy green industry. (Male, age 30s, law officer)*

On the other hand, some people are optimistic about future technologies being to resolve the problem of extra energy use, to conserve energy, or to use energy effectively.

- *Lights in libraries are always on…We need to turn off the lights if there is no one there. Or, if we have motion detectors, the light will turn off automatically when there is no one there. (Male, age 11, grade-5 student)*
- *Some famous construction companies cooperate with interior designers overseas to build green buildings, which emphasize letting sunlight indoors. This can save energy use. (Male, age 20s, solider)*

Design. Green designs without extra goods production and with local wisdom appear to be of innate value and intuitive acceptability.

- *The Eiffel Tower, in Paris, France, turns off half of its lights. Our Taipei 101 can also do this. (Female, age 29, computer programmer)*
- *Originality, in order to survive, you have to do something different. What are you searching for? It's to search within your traditions (origins), not from others, and then you'll make something different. (Male, age 30s, science R&D organization publicist)*

Nature. Some people have decided to yield to nature or to be friends with nature via the acknowledgement that people are deemed to lose in the fight against nature.

- *We can learn from successful experiences of other countries. A report says that the Netherlands made land from the sea in the past but they do not do this now. They return (the land) to the nature. (Male, age 30s, army officer)*
- *Water resource is the most import for organic rice, and then no phytocide and*

pesticides, etc. Only the water from the mountain is clean and not polluted. As such, only very limited land can really generate organic rice. (Male, age 60s, farmer)

- *It's a global issue. You should stop the cutting of the Earth's lung. For example, The Amazon rainforest is cut down at the rate of a football field-size everyday. Why can't we just do our best to stop it? It's the most critical issue. (Male, age 30s, science R&D organization publicist)*

Creation with curiosity based on needs is part of human nature. Over-consumption becomes a reasonable development after over-creation goes beyond our needs (Koger & Winter, 2010). Refining creations and reflecting on consumption to better fit nature appears to reverse our human nature after experiencing all these over-creations and over-consumptions.

3.5. The theme underlying all the tensions and likely solutions: All for our (children's) future

Why are there all these tensions? Why does it appear to be so difficult to implement an energy conservation policy during this critical moment? The theme underlying the tensions and their likely solutions appears to be "future." All the policy and knowledge in relation to global warming tend to focus on a timeline and target in the future, which is perceived by people as:

- *At my age, I don't need to worry about this problem at this stage. But because I have children, their offspring in the future will have a tougher time, because they have to face the consequences…(Male, age 50s, boss of drinks shops)*
- *What I care most about is the problem of global warming. Energy-conservation/carbon-reduction can help slow down global warming, and help children in later generations to have a healthier environment to grow up in. (Female, age 30s, musician)*

Perhaps the theme "future" plays both the roles of barrier and facilitator to the energy policy.

- *Things related to religion are very difficult to change… It may help more if there are young children at home who tell the adults... If every child says "turn off the light!" every time they leave home, you will develop the habit too… And since kids are used to it since a young age, you don't even need to tell them when they grow up. (Female, age 17, Grade 11 senior high school student.)*

The questions raised here may include: What are the lengths of the timeline general people plan for? Do we prepare futures for our children's children? What kind of futures do we wish for our children? Policy makers, educators, and scientists approving energy conservation need to face the challenge of the limitation of the spectrum of public perceptions, interests, and concerns, i.e., "not at my age," an effect in addition to "not in my backyard" (West & Winter, 2010, p. 5739). As a result, we need to figure out solutions for both short-term and long-term interests.

4. Discussion

4.1. Likely solutions to the tensions

The present findings suggest unavoidable and un-ignorable tensions in implementing an energy policy in an Eastern culture, Taiwan. Energy conservation and carbon reduction appear to be composed of economical, effective, and nonintrusive actions to save the Earth given the limited time and tight schedule for human beings to reverse the negative trend of climate change (literature). Dialogue with the results and relevant literature suggests initial likely solutions to the tensions identified in this study, as summarized in Table 1.

Solid knowledge. The theme of the tension in knowledge bases between energy conservation and carbon reduction appears to be "uncertainty." People in Taiwan accept the "fact" that (1) Taiwan heavily relies on foreign energy resources, i.e., fuel coal or oil, which produce pollution and (2) natural resources are not unlimited. The knowledge regarding global warming due to carbon or greenhouse gas emission by energy use and others, however, is "new" to the public. The uncertainty in the knowledge base for carbon reduction has seriously hindered the acceptance of the energy policy by the public, especially when emotional arousal and cultural conflicts are also present.

As such, "solid knowledge" emerges as the theme of likely solutions to this tension. We may focus on "energy" for the present practice and increase the knowledge base of "carbon" by scientific inquiry. Knowledge of energy conservation is relatively solid in the culture and likely short-term solutions may include broadcasting the knowledge, assuming responsibility, limiting energy use, and even increasing fees for extra energy use. On the other hand, the emerging knowledge of "carbon" suggests scientific debate on what created global warming and climate change, and how to mitigate them. The essence of scientific inquiry in relation to the issue of carbon reduction needs to be addressed in classrooms and communicated via mass media. Supplementary teaching materials emphasizing scientific inquiry and hands-on activities need to be provided to teachers to supplement their teaching mainly based on the existing (old-fashioned) curriculum.

Pragmatic idealism. Life styles are developed through time and culture, and appear to be difficult to be changed (Anue, 2007; Lin & Iyer, 2007). The theme underlying the tension in life styles between having and being appears to be "pleasure." Industry revolution and business encouragement have driven people towards materialism (having). On the other hand, reverence for nature and morality is perceived as ways consistent with the implementation of the energy policy. A new future valuing "pragmatic idealism," combining materialism with humanity emphasis on morality, health, and nature, may be the way to promote energy-conservation behaviours. Theorists and studies have indicated that energy-conservation behaviours, if transformed with suitable norms, may be motivated by multiple values, e.g., biosphere, altruism, self-transcendence, and technology values (Hansla, Gamble, Juliusson, & Garling, 2008; Midden, Kaiser, and McCalley, 2007; Schwartz, 1992; Stern, 2000). Short-term solutions may focus on resolving the needs for having (materialism) and include specific strategies for providing a wide range of opportunities for green jobs, increasing individual and community efficacy to implement the energy policy, and promoting values emphasizing the quality of life, not the quantity of materials. Long-term solutions may focus on resolving the needs for "being" (humanity), which may include specific strategies highlighting health, happiness, simplification, and spirituality.

Hierarchical collaboration. Hierarchy in social systems appears to be a reasonable, just, but evil, design by nature and nurture. Participants in this study acknowledge the

unbalanced "power" (the theme of this tension) between the strong and the weak from cross-cultural to group levels. The strong ones appear to have to assume more responsibilities for global warming and compensate for what they are blamed for. This is consistent with the research result of Samson, Berteaux, McGill, and Humphries (2011) that highly industrialized nations that contribute more greenhouse gas emissions will experience less negative impacts of climate change than nations that are not as highly industrialized, i.e., those in most of Africa, the Arabian Peninsula, Central America, Central South America, and Southeast Asia.

Individuals (including people, groups, and nations) are naturally diverse in abilities and performances, and then own diverse "power." The majority of general people, who own and use fewer resources, value the few individuals with high-ability performances, who then become the leaders of the society who own and use more resources and then are expected by the general public to become leaders of morality who use fewer resources. There appears to be a slim chance for a fair game in the battle against global warming.

The general public may be reluctant to conform but still have the willingness to follow authorities. A democratic society, like Taiwan, has a decentralized social system, which may naturally preclude the implementation of an energy policy, which is science-, future-, and change-oriented. People are not well-prepared to accept this high-aiming policy, even though the policy appears to make sense based on scientific evidence and is consistent with traditional cultures (thinking of how people live without these present technologies/artifacts in the ancient times). Many infrastructures in the present society fail to fit the energy conservation policy in all the physical, institutional, and mental aspects.

A democratic or decentralized social system still keeps a hierarchical system, and authorities need to lead if they really believe in the scientific evidence of global warming. With all the present welfares produced by technologies and the reluctance to change, the public ask the authorities to lead the way to break through the possible tragedy, "destroy our mother Earth," and to keep their behaviours consistent with their words. A short-term and easy solution to the tension in social system is a new environmental, moral, or ethical movement launched and modeled by the authorities. Incentive and evaluation systems are developed after the ethical movement. Then, consensus, laws, cooperation, and collaboration among people within nations and around the world are likely long-term solutions.

Sustainable innovation. The theme underlying this tension appears to be "control." Optimism in technology to mitigate global warming represents a desire to externally control nature, while reflective consumption represents a will to internally control self from overusing natural resources (Weber & Perrels, 2000). Pessimism in technology implies a cost assessment in controlling nature, while return to nature represents a profit assessment in controlling self.

Technological, design, and cultural innovations appear to be the main solutions to this tension. In the fight against global warming, the short-term solutions are likely to follow the human nature to create and to control by developing green technology, green design, biodiversity, and cultural diversity. The long-term solutions may be to reverse human nature by submitting to nature and focus on more trees, fresh air, clean natural water, and naturally healthy food.

4.2. Human commonality and cultural specificity of the tensions

Energy use is a common issue for all human beings. This study attempts to go

beyond experts' views to the public's, and we can see how the public's perspectives mimic the experts'. The tensions identified in this study based on public perceptions of energy policy share a large commonality with the diverse notions posited by scholars emphasising an interdisciplinary approach to energy policy and sustainability development, e.g., future; link among social, environmental, and human equity; well-being vs. well-having; and techno- vs. eco-centred (Hopwood, Mellor, & O'Brien, 2005; Keirstead, 2006). Further, the meanings of the tensions are clarified and organized into a framework based on empirical data, which may well represent the multidisciplinary and trans-disciplinary essence of the knowledge in relation to energy use in diverse societies (Giddings, Hopwood, & O'Brien, 2002).

Cultural specificity of the tensions also emerges in some notions underlying the identified tensions, e.g., traditional religions, face-saving, hierarchical collectivism, frugality, and future. The majority of Taiwanese has religious beliefs in Confucianism, Taoism, and Buddhism, which are viewed as solutions to the dominant Western economic principles in the present Taiwanese society for energy use and sustainable development (Lamberton, 2005). These tensions also reflect Hofstede's (2001) descriptions about Taiwan: The Taiwanese have a medium degree of power distance with their leaders and uncertainty avoidance, trying (but not strongly) to solve the problem of uncertainty by new technology, law, and religion. They also have strong collectivism and emphasize large family systems, in which personal behaviours may be determined by elders in the large family or by the whole family. The Taiwanese also have a long-term perspective and a hierarchy system in ordering relationships. They are also persistent, economical, and with a sense of duty.

4.3. Limitation of this study and suggestions for future research

Qualitative methodology can delve into the meaningful world of people in response to the environment (including energy policy), but may bear a weak link to the traditional quantitative fields (i.e., engineering and economics) for the issue of energy. Future research needs to use a mixed methodology, combining both qualitative and quantitative methodologies, to fully address the complex system of interactions among humans in society/culture, science with technology, and climate change in the environment in the implementation of energy policy (Keirstead, 2006). Related research topics/methods may include a psychology study quantifying the variables identified in this study, an economics study modeling the parameters of the variables to conduct, and a technology study designing human-based devices to reduce energy use and carbon emission, and an interdisciplinary study combining all the above methods.

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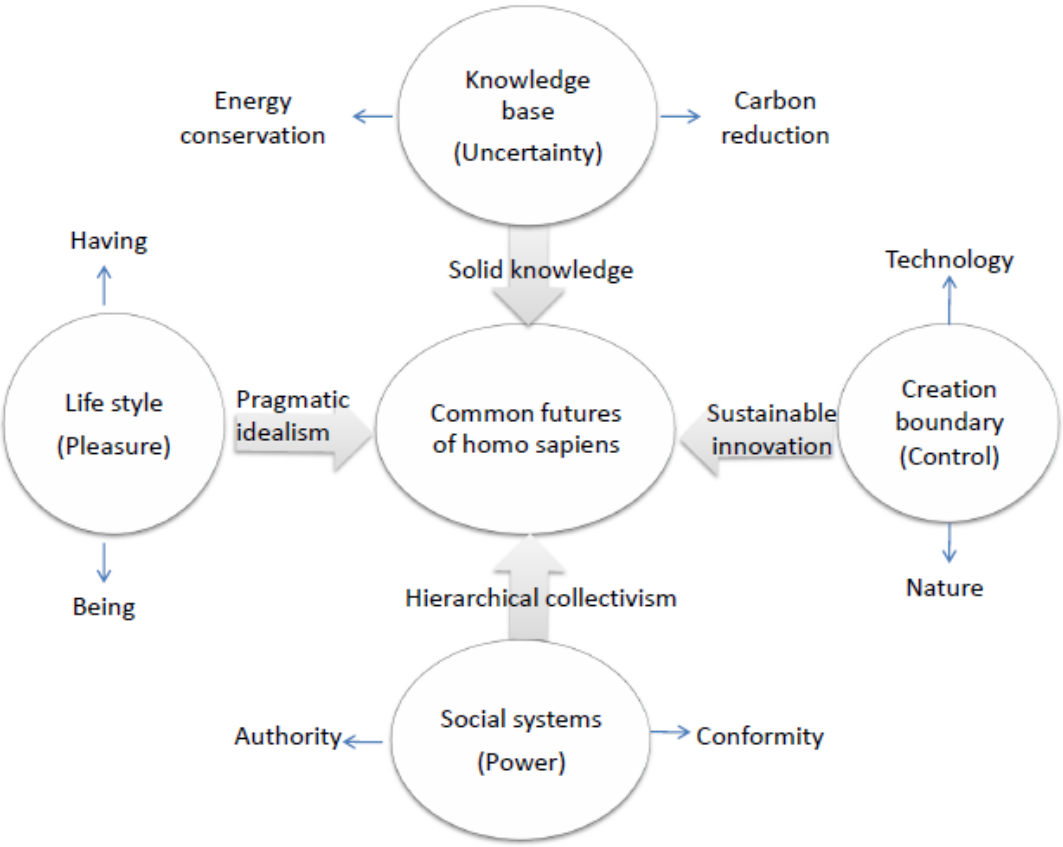

Fig. 1. A model of tensions in implementing an energy policy in a culture

Table 1
Solutions to tensions in implementing an energy policy in a culture

Common aim of homo sapiens: All for our (children's) futures				
Tensions	Knowledge base	Life style	Social system	Creation boundary
Themes	Uncertainty	Pleasure	Power	Control
Main solutions	Solid knowledge	Pragmatic Idealism	Hierarchical collaboration	Sustainable innovation
Strong in culture	Knowledge for energy conservation	Having	Authority	Technology
Short-term solutions	1. Broadcasting the knowledge 2. Assuming responsibility 3. Limiting energy use 4. Fee increases for extra energy use	1. Green jobs 2. Self-efficacy 3. Community-efficacy 4. Quality, not quantity	1. Moral models 2. Action models 3. Incentive system 4. Evaluation system	1. Green technology 2. Green design 3. Biodiversity 4. Cultural diversity
Weak in culture	Knowledge for carbon reduction	Being	Conformity	Nature
Long-term solutions	1. Communicating the knowledge 2. Scientific inquiry 3. Hands-on science educational activities	1. Health 2. happiness 3. Simplification 4. Spirituality	1. Consensus 2. Laws 3. Cooperation 4. Collaboration	1. Trees 2. Fresh air 3. Clean natural water 4. Naturally healthy food

國科會補助專題研究計畫項下出席國際學術會議心得報告

日期：100 年 9 月 2 日

計畫編號	NSC 99-3113-S-004 -001		
計畫名稱	臺灣民眾節能減碳與文化傳統信念與行為間張力之研究。		
出國人員 姓名	邱美秀	服務機構 及職稱	國立政治大學教育學系 副教授
會議時間	2011 年 8 月 20-23 日	會議地點	紐西蘭皇后鎮(New Zealand, Queenstown)
會議名稱	(中文) 紐西蘭心理學會 2011 年會 (英文) New Zealand Psychological Society Conference		
發表論文 題目	(中文) 臺灣民眾推行節能減碳的價值觀與行為落差 (英文) Gaps between public values and behaviours in implementing energy-conservation/carbon-reduction declarations in Taiwan		

一、參加會議經過
20 日註冊與工作坊
21-23 日發表論文、參與各場次學術活動

二、與會心得
1、紐西蘭心理學會為當地主要的心理學研究社群，包括心理學各領域的學者：教育、臨床、諮商、工商組織、法律等。此次除了紐西蘭的心理學家外，有來自英國、美國、加拿大、日本和臺灣的學者與執業人員，共約 300 人參與。
2、紐西蘭心理學會的研討會有數項獨特處：
(1)大量的第一線心理學工作者參與，包括教師、軍人、警察、臨床心理師、教育部工作人員參與發表論文。也有一些博士候選人發表論文。
(2)因紐西蘭多天災，有大量的論文討論「災難的各類議題」，包括對科學數據的解讀、地區民眾的反應、災後心理與教育重建工作。這部分的研究除了心理學家、教育心理學者、學校工作者參與外，也有科學界的學者參與。
(3)重視毛利文化、社會與心理的探討，有不少相關論文歸屬於此「雙文化」的主題，包括英文與毛利媒體對毛利文化的報導分析，毛利人對毛利文化之自覺、教育場域雙文化之實施。紐西蘭人於國小時，每人都需上「基礎毛利文」。會中，在不少論文發表後，大家會起立一起唱毛利文化的歌曲(表示對發表者的尊重)，有一些發表人一開始會說一些毛利文，再以英文發表主要內容。他們對毛利文化的重視，由此可見。
3、此是一個小而美的專業社群，成員大多早已熟識，論文水準高，很重地域文化不同對心理研究的影響。

三、建議
1、臺灣也如紐西蘭，為多天災之地，我們似乎需要更多人文方面的跨領域天災研究。未來，也可以與紐西蘭的研究團隊合作。事實上，他們的研究團隊本身即是跨國的，在會中，曾與來自英國的一個論文發表者討論，她主要研究領域是科學與工程方面，但因為從事災區研究，故也會研究「人」的議題-此次發表的論文(她為三位作者之一，其中有心理學家)，即來自訪談當地人之去留意願等。她說，她目前常輪流在不同地方工作，包括英國、紐西蘭、一個英國殖民地(多火山(灰)的災區)。

2、會中有數篇論文是討論：媒體報導的科學與文化的內容、閱聽人的解讀。這也許是個有趣的研究主題。

四、攜回資料名稱及內容
1、會議議程(含所有論文的摘要)。
2、論文發表的 ppt，由作者選擇自由分享於:
http://www.slideshare.net/event/nzpss-conference-2011，有興趣者可自行下載。

附一、論文被接受發表之大會證明文件

-----Original message-----
From: Heike<pd@psychology.org.nz>
To:chium<chium@nccu.edu.tw>
Date: Tue, 1 Mar 2011 14:38:25 +1300
Subject: RE: Conference Abstract
Dear Mei-Shiu Chiu,

Thank you for submitting an abstract for a poster presentation at the New Zealand Psychological Society 2011 conference. This submission has been reviewed by the Conference Program Committee, and I am pleased to let you know that it has been accepted for presentation at this conference.
In addition, to confirm acceptance of your presentation we will require that you register for the conference no later than **15 May**.

Thank you, and we look forward to your involvement in our conference.

Kind regards
Heike

Heike Albrecht
Professional Development Coordinator

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附二、發表論文摘要：Chiu, M.-S. (2011). Gaps between public values and behaviours

in implementing energy-conservation/carbon-reduction declarations in Taiwan. Paper presented at the New Zealand Psychological Society Conference, Queenstown, New Zealand, August 20-11. (NSC 99-3113-S-004 -001)

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Presentation Title: Gaps between public values and behaviours in implementing energy-conservation/carbon-reduction declarations in Taiwan
Proposed Format of Presentation: a poster session
Areas of Psychology:
Developmental Educational
Abstract
Ten energy-conservation/carbon-reduction declarations are posited by the government in Taiwan as public guidelines to mitigate global warming. Public perceived values and behaviours in implementing the declarations were explored by semi-structured interview with quantitative assessment for 91 people (46 females) of different ages. The results of factor analysis reveal that the ten declarations include two constructs (effective and limited use of resources) in terms of value, and one construct in terms of behaviour. The results of multivariate repeated measure tests on the differences between values and beha viours for the ten declarations show significant gaps. Females endorse more values to the declarations than males, despite few gender differences in behaviour. Seniors report more positive behaviours than juniors. Interview data are analyzed based on Stern's value-belief-norm theory to supplement the quantitative results. The findings suggest ways to improve the energy policy and to elaborate the theory.
Acknowledgements: This research was supported by the National Science Council, Taiwan (NSC 99-3113-S-004-001).

國科會補助計畫衍生研發成果推廣資料表

日期:2011/08/31

國科會補助計畫	計畫名稱: 台灣民眾文化傳統與節能減碳信念與行為間張力之研究
	計畫主持人: 邱美秀
	計畫編號: 99-3113-S-004-001- 學門領域: 節能減碳教育國家型計畫

無研發成果推廣資料

99 年度專題研究計畫研究成果彙整表

計畫主持人：邱美秀	計畫編號：99-3113-S-004-001-
計畫名稱：台灣民眾文化傳統與節能減碳信念與行為間張力之研究	

成果項目			量化			單位	備註（質化說明：如數個計畫共同成果、成果列為該期刊之封面故事...等）
			實際已達成數（被接受或已發表）	預期總達成數(含實際已達成數)	本計畫實際貢獻百分比		
國內	論文著作	期刊論文	0	0	100%	篇	
		研究報告/技術報告	0	0	100%		
		研討會論文	1	1	100%		Chiu, M.-S. (2010). Perceptual map of environmental responsibility in relation to gender, socioeconomic status, and environmental/science/technology education. 論文發表於第 26 屆中華民國科學教育學術研討會，國立東華大學美崙校區，花蓮，中華民國 99 年 12 月 10、11、12 日。(NSC 99-3113-S-004 -001)
		專書	0	0	100%		
	專利	申請中件數	0	0	100%	件	
		已獲得件數	0	0	100%		
	技術移轉	件數	0	0	100%	件	
		權利金	0	0	100%	千元	
	參與計畫人力（本國籍）	碩士生	0	0	100%	人次	
		博士生	0	0	100%		
		博士後研究員	0	0	100%		
		專任助理	0	0	100%		
國外	論文著作	期刊論文	1	1	100%	篇	Chiu, M.-S. (2010). Effects of science interest and environmental responsibility on science aspiration and achievement: Gender differences and cultural supports. Educational Research and Evaluation, 16, 345-370. (NSC 99-3113-S-004 -001)
		研究報告/技術報告	0	0	100%		
		研討會論文	1	1	100%		Chiu, M.-S. (2011). Gaps between public values and behaviours in implementing energy-conservation/carbon-reduction declarations in Taiwan. Paper

							presented at the New Zealand Psychological Society Conference, Queenstown, New Zealand, August 20-11. (NSC 99-3113-S-004 -001)
		專書	0	0	100%	章/本	
	專利	申請中件數	0	0	100%	件	
		已獲得件數	0	0	100%		
	技術移轉	件數	0	0	100%	件	
		權利金	0	0	100%	千元	
	參與計畫人力（外國籍）	碩士生	3	3	100%	人次	賴思宇、孟恬薪、謝智如
		博士生	2	2	100%		薛凱方、陳柏霖
		博士後研究員	0	0	100%		
		專任助理	0	0	100%		
其他成果(無法以量化表達之成果如辦理學術活動、獲得獎項、重要國際合作、研究成果國際影響力及其他協助產業技術發展之具體效益事項等，請以文字敘述填列。)		無					

	成果項目	量化	名稱或內容性質簡述
科教處計畫加填項目	測驗工具(含質性與量性)	1	「節能減碳」訪談問題
	課程/模組	0	
	電腦及網路系統或工具	0	
	教材	0	
	舉辦之活動/競賽	0	
	研討會/工作坊	0	
	電子報、網站	0	
	計畫成果推廣之參與（閱聽）人數	0	

國科會補助專題研究計畫成果報告自評表

請就研究內容與原計畫相符程度、達成預期目標情況、研究成果之學術或應用價值（簡要敘述成果所代表之意義、價值、影響或進一步發展之可能性）、是否適合在學術期刊發表或申請專利、主要發現或其他有關價值等，作一綜合評估。

1. 請就研究內容與原計畫相符程度、達成預期目標情況作一綜合評估

■達成目標

□未達成目標（請說明，以 100 字為限）

□實驗失敗

□因故實驗中斷

□其他原因

說明：

2. 研究成果在學術期刊發表或申請專利等情形：

論文：■已發表 □未發表之文稿 □撰寫中 □無

專利：□已獲得 □申請中 ■無

技轉：□已技轉 □洽談中 ■無

其他：(以 100 字為限)

3. 請依學術成就、技術創新、社會影響等方面，評估研究成果之學術或應用價值（簡要敘述成果所代表之意義、價值、影響或進一步發展之可能性）(以 500 字為限)

本研究旨在探討台灣民眾在節能減碳與文化傳統的信念與行為間所經驗到的張力，並探討重新建構此張力、以及化信念為行動的可行性。研究目的是建構「節能減碳」與「文化傳統」信念與行為間張力的理論，做為後續三年研發「國民節能減碳素養工具」與「課程教學設計」以及進行實驗教學的基礎；此外，民眾對「節能減碳」議題化信念為行動的可行方案建構，可提供政府據以訂定適當的因應策略與措施。本研究之主要研究對象為居住於臺灣各世代的民眾，並盡可能擴大受訪者的變異性(包括性別、城鄉、社經背景等)。本研究採用質、量並行的研究取向，訪談問題包括質性訪談問題與量化問卷題目。目前已正式發表三篇學術期刊與研討會論文，另有其他論文將陸續發表。