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Abstract

The extent to which nuclear energy can be a feasible energy option has re-emerged as a subject of widespread debate following the Fukushima accident in Japan. However**,** relatively little is known about how public inputs can improve nuclear decision-making. This paper aims to provide a better understanding of public opinions regarding nuclear energy by examining its risk perception, trust and public engagement dimensions. Based on a survey of Hong Kong residents (n=509), we make some observations. Firstly, we offer empirical evidence that affirms the theoretical connections between risk perception, trust, and public engagement in the context of nuclear energy. Secondly, our logistic regression analysis indicates that demographics, trust, and perceptions of the efficacy of public engagement are factors explaining perceptions of greater risks and nuclear opposition. Thirdly, our conceptual model sheds light on the complexity of the trust concept, and specifies aspects of trust that are influential in the contexts of risk perception and nuclear choices. Our findings suggest that the Hong Kong government must ensure trust building receives prominent attention in nuclear decision-making, and that it should avoid excessive reliance on the business sector and should assume a key role for itself in enhancing trust in nuclear decision-making.

1. INTRODUCTION

1.1 Background and study approach

The threats of global climate change and increasingly expensive fossil fuels have prompted many nations to reconsider the development of nuclear energy as an energy option. However, the extent to which and just how nuclear energy can be an energy option is a central but contentious energy policy issue worldwide. As early as the 1970s, public opposition to nuclear energy halted nuclear expansion plans in Germany and the US (Glaser, 2012; Surrey and Huggett, 1976). Public opposition to nuclear energy, however, seemed to wane from the early 2000s as the "nuclear renaissance" that emerged across Europe co-existed with nuclear expansion plans in major emerging economies including China and India (Goodfellow et al., 2011; Yang and Xu, 2013). However, these pro-nuclear energy strategies came under urgent review in 2011 following the Fukushima nuclear accident in Japan. While some countries, including Germany, Belgium, and Austria, decided to phase out nuclear, some countries such as France and China remained committed to continuing their nuclear expansion plans but with a commitment to developing more stringent safety standards and regulatory systems (Renewables International, 2013; Yang and Xu, 2013).

Public acceptability of nuclear energy matters to policy-makers because the choice of nuclear energy and related siting decisions often trigger a public outcry resulting in the deflection of policies as well as project delays (Glaser, 2012). Building public support for nuclear-related energy decisions however poses particular challenges for policy-makers for a number of reasons. Nuclear decision-making involves not only technical issues but also a complex mix of economic, social, environmental and governance concerns such as risk management and public distrust (OECD, 2010). These concerns also involve a wide range of stakeholders within and outside government including the general public, nuclear plant operators, the media, NGOs as well as academics and epistemic communities (OECD, 2010). It is therefore important to understand public perceptions of this energy option and how to engage the public effectively to improve the efficacy of nuclear decision-making.

This paper explores Hong Kong's nuclear decision-making from the perspectives of effective governance, with particular reference to two key processes – facilitating trust-building and improving public engagement. We aim to contribute to our empirical understanding of public perceptions of nuclear risks, the opportunities for, and barriers to, improving trust and public engagement, and how nuclear decision-making processes should respond and address these governance issues in the context of Hong Kong. This paper presents the results of a public opinion survey of approximately 500 local residents in Hong Kong conducted in 2013.

Hong Kong merits study for a number of reasons. The use and development of nuclear energy has provoked considerable local public opposition over recent decades (Hsiao et al., 1999). While Hong Kong is atypical and differs from other cities in important ways in terms of its socio-economic and political context as well as the characteristics of its power sector, it nonetheless shares with many developed and developing economies the challenges of managing public distrust and promoting public engagement in various policy areas ranging from nuclear energy, to public health, transport, and GM food (Gilson, 2003; Poortinga and Pidgeon, 2003; Zhang et al., 2005). Hong Kong's experience in nuclear decision-making therefore has a relevance that extends beyond its own boundaries, and may contribute to our understanding of how cities and countries respond to public policy issues that include, but are not limited to, energy challenges.

In the rest of this introductory section we discuss some key theoretical concepts relating to nuclear risks, trust and public engagement. We will then provide an overview of the major developments associated with nuclear energy in Hong Kong. This is followed by a detailed discussion of our survey results. The final section discusses the conclusions and policy implications derived from our findings.

1.2 Theoretical perspectives

1.2.1 Nuclear choices and risk perception

The energy literature provide clear evidence that public perceptions are crucial to energy policies, from energy planning to project implementation (Boehmer-Christiansen, 1990; Venables et al.,

2008), and across all major energy areas ranging from coal and other fossil fuels (Wittneben, 2012), to renewable energy (Swofford and Slattery, 2010), and to energy efficiency (Reynolds et al., 2012). Within this work there is also a body of nuclear-related literature. Public perceptions of nuclear energy have attracted attention from academics and policy-makers in part because public support or opposition to this energy option is found to be critical in nuclear choices. Public concerns relating to nuclear risks, radioactive waste disposal and distrust in the nuclear sector have affected the pathways, scale, and pace of nuclear deployment around the world (Ipsos MORI, 2010; Macilwain, 2011; OECD, 2010).

An emerging body of the risk literature has shed light on the nature and challenges relating to nuclear choices. Risk is defined by the probability of an event and magnitude of its consequences (Jacobs and Worthley, 1999). Risk perception is found to be a crucial factor affecting nuclear choices (Goodfellow et al., 2011; Venables et al., 2008; Venables et al., 2012). Managing risk perception has however posed particular challenges to policy-makers for a number of reasons.

Firstly, the public tends to differentiate nuclear risks from other technological risks as a special kind of risk. When compared with other risks such as those associated with cancer, nuclear risks are often perceived as having a profile characterised by a low probability of occurrence but catastrophic and long-term health impacts (NERC, 2010; Scholz and Siegrist, 2010). People tend to express only a "reluctant acceptance" of nuclear energy as a "solution" to climate change, indicating that difficult trade-offs have to be made by the public when considering choices relating to nuclear energy (Pidgeon et al., 2008).

Secondly, the public is concerned with a broad range of issues associated with this energy option. These include non-technical issues relating to costs, environmental and health impacts, ethics of the disposal of radioactive waste, as well as information disclosure (Ipsos-Reid, 2003; Ipsos MORI, 2010).

Thirdly, the notion of risk is highly dynamic as it is socially, culturally and historically constructed, and changes over time and space (Irwin et al., 2000). Studies have also found that perceptions of nuclear risks can be affected by demographics and experience (Corner et al., 2011;

Hadjilambrinos, 2000; Sjöberg, 2000). These socio-political dimensions of nuclear risks imply that managing risk perception requires more than technical expertise. However, traditional, technocratic policy-making systems have only a limited ability to deal with nuclear decision-making which is often value-laden (Valentine and Sovacool, 2010) and involves incomplete knowledge (Power, 2004). It is in this risk management context that trust and public engagement are perceived as two different but complementary concepts that can provide a firmer platform for effective nuclear decision-making (Aegerter and Bucher, 1993; Bradbury et al., 1999).

1.2.2 Trust matters to managing risk perceptions

Trust is a "psychological state comprising the intention to accept vulnerability based upon positive expectations of the intentions or behavior of another" (Rousseau et al., 1998, p. 395). Trust is regarded as a prerequisite for effective risk management (Brecher and Flynn, 2002; Cvetkovich and Löfstedt, 1999; Poortinga and Pidgeon, 2003), and is crucial to enhance policy legitimacy and improve policy efficacy (Braithwaite, 1998; Kim, 2005). The concept of trust has been studied in the context of various major risk issues that range from climate change, to radiation from mobile phones, radioactive waste, genetically modified food, and to human genetic testing (Poortinga and Pidgeon, 2003). In the nuclear literature, trust has been found to be critical in influencing the acceptability of the nuclear option (Hunt et al., 1999; Poortinga and Pidgeon, 2003; Teräväinen et al., 2011).

Trust is a complex concept because of its multiple actor and multi-faceted nature. Some studies have found that scientists and environmental NGOs are seen as more trustworthy while energy companies, nuclear safety authorities, journalists, and political parties are less trusted (European Commission, 2007; OECD, 2010). Some studies (see for example Poortinga and Pidgeon, 2003; Walker et al., 2008), on the other hand, have developed different, but complementary ways to distinguish and assess different dimensions of trust. Some studies have underscored trust in motives (for example motives to lie) (Coleman, 1990; Hardin, 1996), trust in transparency (Frewer et al., 1996), and trust in competence (Mayer et al., 1995) as key dimensions. Other studies have identified integrity, transparency, competency, care, fairness, credibility, openness, responsiveness, and reliability as key attributes of trust (Denhardt, 2002; Poortinga and Pidgeon, 2003; Upham and Shackley, 2006; Walker et al., 2008).

1.2.3 Public engagement as a mechanism for enhancing trust

Public engagement has been increasingly recognised as one of the important mechanisms for enhancing trust (Bellaby, 2007; Bloomfield et al., 2001; Bradbury et al., 1999; Brunk, 2006; Denhardt, 2002; Petts, 2008; Stebbing, 2009; Wang and van Wart, 2007; Wynne, 2006). It is the practice of involving members of the public in agenda-setting, decision-making, and policy formulation activities of organisations or institutions responsible for policy development (Rowe and Frewer, 2004). In the context of risk management, public engagement is used to inject and integrate different values and knowledge into decision-making systems in order to make more socially and morally acceptable decisions and to improve the quality of decisions (Renn and Schweizer, 2009; Rowe and Frewer, 2000).

Public engagement however cannot guarantee positive outcomes. Ineffective public engagement may create distrust (Involve and GuideStar UK, 2008). Barriers to effective engagement are many. These include time constraints, a low level of public awareness on the issue, pre-existing public distrust, poor access to information and communication technology, and low confidence and expectations in the effectiveness of public engagement itself (Lorenzoni et al., 2007; OECD, 2009).

To facilitate effective nuclear decision-making, there is a need to consider nuclear energy as an energy option from the perspectives of risk perception, trust and public engagement. There are however knowledge gaps. Firstly, theoretical linkages between these important concepts are not fully understood. Secondly, public opinion surveys on nuclear issues have mostly focused on public perceptions of nuclear risks, perceived benefits, major concerns and willingness to pay (Ipsos-Reid, 2003; OECD, 2010). Nuclear surveys that shed light on associated trust and engagement issues are limited, with few exceptions such as the work of Poortinga and Pidgeon (2003), Turcanu et al. (2013), and Whitfield et al. (2009). Thirdly, in the specific context of Hong Kong, improving public engagement and trust in nuclear energy decision-making is an area that is little researched. Work by Walker et al. (2008) found that trust levels in environmental policy-making in Hong Kong are low, and are influenced by a perceived lack of leadership and transparency, institutional inertia, and the relationship between the Hong Kong

government and the Chinese central government. Work by Lam and Woo (2009) on the other hand explored the relationships between public attitude towards the siting of locally unwanted land uses and public trust.

1.3 Nuclear energy: The Hong Kong context

Located on the southeast coast of China, Hong Kong has a population of 7 million people and extends over a geographical area of about 1,104 km^2 (CSD, 2012). Hong Kong is a Special Administrative Region of China. It enjoys a relatively high degree of autonomy in executive, legislative, and judicial matters under the authority of China's central government (Conney, 1997). The "one country, two systems" political framework that has determined central-local relations since the return of Hong Kong to Chinese sovereignty in 1997 has led to complex and dynamic interactions between the Mainland central government, the provincial government of neigbouring Guangdong, and the Hong Kong government in all major policy areas including energy (Chow, 2001; Lo, 2008; Mah et al., 2012b).

At present, nuclear energy contributes 23% of the total electricity consumption in Hong Kong, the same amount as natural gas (23%) but lower than that of coal (54%) (Environment Bureau, 2010). Renewables represent only a very insignificant amount of local energy production and this is unlikely to change in the foreseeable future due to a lack of interest on the part of local electricity suppliers and the absence of strong and positive policy guidance from the government. In recent years the issues of possible climate change impacts, local air pollution problems, and energy security have heightened public concern about the sustainability of this largely fossil fuel-based power system (Environment Bureau, 2010).

Electricity in Hong Kong is supplied by two utilities, China Light and Power (CLP) and Hongkong Electric (HKE). Both are privately-owned, vertically integrated, and operate as geographical monopolies (Chow, 2001; Lo, 2008). Hong Kong does not have nuclear power plants within its own territory (Environment Bureau, 2010). Nuclear energy is supplied across the border from a nuclear power plant in Daya Bay in neighbouring Guangdong Province. CLP was one of the original investors (owning 25% of the plant) in this project when construction

commenced in the 1980s and has subsequently purchased 70% of the power produced which it then imports into Hong Kong (CLP, 2010).

Hong Kong does not have an explicit energy policy. There is only a generic policy framework that highlights reliability of supply, affordability, cost efficiency, and public safety as important elements of energy management in Hong Kong (Economic Services Bureau, 1998). The financial and environmental performance of the electricity sector is primarily regulated through what are termed "Scheme of Control Agreements" (SCAs). These are agreements signed between the Hong Kong government and the two power utilities that set out permitted rates of return for the companies mainly in relation to the size of their net fixed assets, although some minor incentives are also provided for environmental and energy efficiency performance (Environment Bureau, 2008).

The central-local dimension and the cross-border nature of energy planning is another feature of Hong Kong's electricity sector. Major energy options for the city, including natural gas and nuclear energy, depend on supplies from Guangdong and other parts of the Mainland (CLP, 2013; CSD, 2013; ISD, 2013; Thomas, 2013). It is therefore not feasible to think in terms of a truly autonomous energy policy for Hong Kong. Relations with the Mainland will always figure prominently.

The stakeholder landscape of the electricity sector is highly dynamic. While the Hong Kong government and the two power companies are the key decision-makers, the Mainland central government and the Guangdong government, as noted, also have important roles to play. In addition, civil society in Hong Kong has been increasingly active in recent years and this has given rise to more active roles for legislative councilors, political parties, environmental groups as well as the media (Oxfam, 2010).

Nuclear energy has been an important and controversial component of the local energy system since 1994 when CLP first started to import nuclear power from the Daya Bay plant. Indeed, public opposition to the nuclear option goes back even further and was marked by major public demonstrations in 1986 when a million Hong Kong residents signed a petition against the construction of the plant itself. This opposition was in part provoked and sustained by safety concerns arising from the earlier nuclear accident at Chernobyl (Hsiao et al., 1999; Kadak, 2006).

Opposition to nuclear energy waned somewhat during the 1990s but re-emerged in late 2010 when the government proposed in a climate change consultation paper to increase the use of nuclear energy from the current 23% to 50% by 2020 as a key mitigation measure. The Fukushima nuclear accident in March 2011, only three months after the consultation ended, further intensified public opposition to the nuclear option (Mah et al., 2012b).

The cross-border dimension of nuclear energy in Hong Kong, and the associated equity and risk management issues, are particularly important and distinctive features of the case. Apart from importing nuclear power from Guangdong, Hong Kong depends on the Mainland to handle the radioactive waste. While 70% of the electricity generated from Daya Bay nuclear power plant is supplied to Hong Kong, the resulting nuclear waste, which amounts to about 75 tonnes each year, is stored and handled by facilities in the Mainland (Kadak, 2006; WNA, 2013).

The nuclear development plan for Guangdong Province is also highly relevant to risk perceptions in Hong Kong. At present there are two nuclear stations in operation (six reactors with a total capacity of 6,108 MW) located within 50 km of Hong Kong (CLP, 2010; WNA, 2013). Two further nuclear plants are under construction (eight reactors with a total capacity of 10,004 MW) (WNA, 2013), and another 7 are proposed in Haifeng, Hebaodao, Heyuan/Jieyang, Huizhou, Lufeng, Shaoguan, Taishan (Unit 3 &4) (20 reactors with a total capacity of 24,500 MW) [1] (WNA, 2013) (Figure 1). A recent proposal to build a uranium processing plant in Jiangmen, Guangdong, has attracted wide media coverage in Hong Kong (Wong and Chan, 2013) and is another illustration of the prominence and sensitivity of cross-border issues in the nuclear debate in Hong Kong.

[Insert Figure 1 about here]

[1] Data relating to the number of reactors and the installed capacity of the proposed Hebaodao nuclear plant is not included because it is not publicly accessible.

2 STUDY OBJECTIVES AND METHODS

This paper explores Hong Kong's nuclear decision-making from the perspectives of effective governance, with particular reference to two key processes – facilitating trust-building and improving public engagement. A telephone survey was conducted between 9th and 20th of May, 2013, using a random sample of 509 respondents drawn from Hong Kong residents of age 18 or above who speak the local Chinese dialect of Cantonese. The overall response rate was 67.3%. Cantonese speaking residents represent approximately 90% of the population (CSD, 2012). The sampling error for percentages was less than plus/ minus 4.4% points at the 95% confidence level.

Based on a review of the literature, a questionnaire was designed by the authors. There were four main sections in the questionnaire: 1) respondents' perceptions of the benefits, risks, concerns, trade-offs, and acceptance of nuclear energy; 2) respondents' assessment of the importance and practice of public engagement on nuclear energy; 3) respondents' trust levels in nuclear energy and in key actors; and, 4) respondents' socio-demographic characteristics.

To ensure valid and reliable samples, we commissioned the Public Opinion Programme at The University of Hong Kong, a research institute which has substantial experience of survey research, to administer the telephone survey and conduct preliminary data analysis. Pilot testing was conducted and no major changes in the questionnaire were required.

This study adopted several measures to minimise sampling bias. First, telephone numbers were drawn randomly from the residential telephone directories published by the Hong Kong government as "seed numbers". Based on this set of telephone numbers, another set of numbers was generated using the "plus/minus one/two" method to capture the unlisted numbers. Duplicated numbers from the two sets were filtered, and the remaining numbers were mixed randomly to derive the final telephone sample for this study. Second, our analysis is based on the weighted sample to correct for the demographics of response bias. We weighted survey responses to match the demographics of Hong Kong population. Details of the sampling method, questionnaire design, and responses are reported in Chung et al. (2013), and are available at http://www.kadinst.hku.hk/nuclear/files/Final_Nuclear_policy_English_report_20130718[1].pdf.

3 RESULTS AND DISCUSSION

3.1 Perceptions of nuclear energy as an energy choice

Our survey revealed divided views on nuclear energy. When asked to what extent our respondents would support or oppose various energy choices for electricity generation, 32.8% indicated that they supported nuclear as a power source while 35.4% were opposed to it (Figure 2). Our results also indicate that a substantial proportion of respondents were undecided on the nuclear energy option. 28.0% of the respondents stated that they were "half-half" on this option, meaning that they partly supported nuclear and partly opposed it, and they found it difficult to differentiate whether they supported or opposed more.

This finding is quite different to that of an earlier Hong Kong survey conducted just two months after the Fukushima accident which showed strong opposition to the nuclear option (62% of respondents stated they opposed the greater use of nuclear) (Mah et al., 2012b). One possible explanation for this shift in public opinion is that the Fukushima accident had immediate and profound effects on public perceptions of nuclear risks in Hong Kong. However, such effects may not be long-lasting and our finding is consistent with studies that found that the change in public perceptions towards nuclear energy was relatively limited after the Fukushima accident (Hayashi and Hughes, 2013).

Chi-square tests were performed to assess whether the socio-economic characteristics are significantly different among respondents who supported, opposed, and were undecided about nuclear energy. The results suggest that gender ($p = .000$), number of children ($p = .000$), and income ($p = .004$) are significantly different among these three groups of respondents. As shown in Table 1, people who were undecided or opposed nuclear energy were mostly female, compared to those who supported nuclear energy were mostly male. Respondents of all three groups also tended to have low to moderate income ($HK30,000 or less), and have at least one child. Another observation is that there was clear support for the use of more renewables (93.6%) and natural gas (80.0%). Support for coal was relatively low at 26.2% (Figure 2).

[Insert Table 1 about here]

[Insert Figure 2 about here]

3.2 Perceptions of nuclear risks, and perceived benefits and costs of nuclear energy

Our survey findings are consistent with previous research elsewhere (Berube et al., 2011; Department of Health, 2009; Hinman et al., 1993; Jacobs and Worthley, 1999), in that our respondents perceived quite a high risk of being exposed to nuclear radiation. In terms of exposure likelihood of the four types of risks that we identified (i.e. cancer risks, nuclear radiation risks, traffic accidents and terrorism risks), "nuclear radiation risks" are perceived as the second greatest risk (31.6%). This is second only to cancer risks (38.5%), and is substantially higher than those from "traffic accident" (23.3%) and "terrorism risks" (11.0%) (Figure 3). One possible explanation of this high risk perception of nuclear energy is that the public tends to believe that they would be affected by nuclear radiation if there were to be a major nuclear accident at a plant in neighbouring Guangdong Province.

[Insert Figure 3 about here]

We also asked our respondents to evaluate perceived benefits and major costs of nuclear energy. In terms of perceived benefits, most respondents stated that nuclear is "reliable in supply" (54.2%), "environmentally friendly" (49.8%), and "affordable" (38.7%). On the other hand, most respondents stated that they are concerned about "effects of radiation exposure" (85.3%). It is important to note that respondents had concerns that are not limited to those of a technological nature. Respondents were also concerned about issues such as "uncertainty over liability and compensation in the case of nuclear incidents (81.6%)", "disposal of radioactive waste" (81.2%), and "lack of regulations" (74.6%) (Figure 4).

[Insert Figure 4 about here]

Some of these concerns, including disposal of radioactive waste and lack of regulations, are consistent with previous public opinion polls conducted elsewhere (Ipsos-Reid, 2003; Ipsos MORI, 2010). However it is interesting to note that "lack of regulations" figures more prominently in our survey than in those conducted elsewhere prior to Fukushima (Ipsos-Reid, 2003). One possible explanation for this may be that public awareness of regulatory issues concerning nuclear energy has been heightened by the Fukushima accident. Specifically, the regulatory failures of the Japanese government have been identified as a major cause of the accident (IAEA, 2011).

While "cost" appears to be the least significant concern of our respondents, this result should be interpreted with caution. Although only 32.8% of respondents stated they were concerned about the increased costs of nuclear energy, a majority (59.1%) of respondents either disagreed that cost was not their concern or stated "half-half" (at 39.0% and 20.1% respectively).[2] These results indicate that the costs of nuclear energy may remain a major issue of public concern.

3.3 Public engagement

The survey questioned respondents about their views concerning a recent major public engagement exercise on nuclear energy in Hong Kong – the consultation on climate change strategies launched by the Hong Kong government in late 2010 – and what, if any, were the barriers they encountered in participating in the consultation.

Our results suggest that most respondents (74.9%) agreed that public engagement is an important part of nuclear decision-making. However the 2010 consultation on climate change strategies was highly ineffective in engaging the public. A majority of our respondents (88.1%) did not know about the consultation paper on climate change strategies published by the government in September 2010.

[2] These respondents who stated that they were "half-half" on this option mean that they partly supported the statement and partly disagreed with it, and they found it difficult to differentiate whether they agreed or disagreed more.

Our respondents stated that major barriers for them to participate in the consultation are "not aware of the consultation" (79.0% agreed), "no comprehensive and balanced information" (68.0%), a perception that "I can't make a difference anyway" (64.7%), lack of time (51.0%), and a perception that "the government will do a good job without my inputs" (44.6%) (Figure 5). These results are generally consistent with the findings of previous public opinion polls conducted in western countries regarding barriers to public engagement (Ipsos-Reid, 2003; Lorenzoni et al., 2007; OECD, 2009).

[Insert Figure 5 about here]

3.4 Trust

3.4.1 Who is trusted?

To understand the level of public trust towards different stakeholder groups, we asked our respondents whether they have concerns about nuclear energy because they do not trust specific stakeholder groups. There are three important findings. Firstly, our results indicate that the perceived level of trust of various parties was generally low. All major energy decision-makers in Hong Kong, including the Hong Kong and Chinese governments, utilities, and legislative councilors were perceived as not being trustworthy (Figure 6).

Secondly, our respondents had greater trust in academics/experts, and environmental groups. Relatively fewer respondents indicated that they did not trust these stakeholders ("environmental groups" (31.9%) and "academics/experts" (27.2%)). On the other hand, "the Guangdong government" (58.9%), "the Mainland central government" (57.9%), "the nuclear power plant operators" (52.6%), "legislative councilors" (51.0%) and "the Hong Kong government" (43.2%) were most distrusted, followed by "the advisory committees related to energy and environment" (37.1%), "media" (35.9%), and "the International Atomic Energy Agency" (34.0%) (Figure 6). These findings are consistent with previous research. People tend to have the greatest trust in

academics and environmental groups who are typically perceived as having fewer vested interests (OECD, 2010; Whitfield et al., 2009). Nuclear power operators and regulatory agencies are among the most distrusted stakeholders (CNA, 2012).

Thirdly, our results highlight the multiple dimensions of trust in relation to both the central and local governments. Our respondents seem to have differing views on the trustworthiness of the governments in Beijing, Guangdong, and Hong Kong. While they had greatest distrust of the Central and Guangdong governments, they tended to find the Hong Kong government somewhat more trustworthy (Figure 6). Findings from studies elsewhere suggest variations in trust levels at different jurisdictional levels: a nuclear survey by the European Commission, for example, has found that Swedish respondents had high levels of trust in their local, regional as well as national authorities while French and British respondents had high distrust in their local authorities (OECD, 2010).

[Insert Figure 6 about here]

3.4.2 What did they trust?

To find out what the respondents trusted or distrusted, we asked them their views on three key dimensions (namely trust in motives, trust in transparency, and trust in competency) in relation to three parties who all play a major role in nuclear decision making for Hong Kong: namely *the Chinese government* (which we take to include the Mainland central government and Guangdong provincial government), *the Hong Kong government*, and *the Daya Bay Nuclear Power Operators*.

To assist respondents in comprehending these trust-related concepts, we provided a set of seven attributes that embody these three dimensions of trust. Indicators are also provided for each attribute. These key dimensions, attributes and indicators of trust were developed from the work of Poortinga and Pidgeon (2003) and Walker et al. (2008). They are tabulated in Table 2 below.

[Insert Table 2 about here]

In relation to trust in motives, our results indicate that more than half of the respondents agreed that the three parties were seen as being "unable to stand firm on the principle of acting in the best interest for Hong Kong people because of their vested interest" (the "integrity" attribute). The results were similar for all three parties at 54.7%, 55.6% and 57.2% for the Chinese government, the Hong Kong government, and the nuclear plant operators respectively. More than half of the respondents agreed that all three parties "did not pay sufficient attention to safeguard the well-being of Hong Kong people" (the "care" attribute), at 51.7%, 52.8% and 55.5% for the operators, the Hong Kong government, and the Chinese government respectively. Similarly, more than half of the respondents agreed that all three parties made "biased nuclear energy decisions and failed to balance the interests of different stakeholders" (the "fairness" attribute), at 57.5%, 56.0% and 55.2% for the Chinese government, the Hong Kong government, and the operators respectively.

In relation to the transparency dimension of trust, our results indicate that a majority of respondents had a high level of distrust in the three parties. A clear majority thought the Chinese government (66.6%), the Hong Kong government (66.0%), and the operators (64.1%) were "failing to make all the relevant information accessible to the public" (the "openness" attribute). Furthermore, relatively more people believed the Chinese government"(45.7%) and the operators (42.0%) "distorted facts about nuclear energy" (the "credibility" attribute). Only 30.0% believed "Hong Kong government" would do so.

In relation to trust in competency, nearly half of the respondents (49.0%) agreed that the Hong Kong government "lacked professional knowledge and technical expertise to make good decisions on nuclear energy", while the respective figures for the Chinese government and "Operators" were slightly lower at 44.7% and 37.1% respectively.

3.5 Statistical analysis

To gain additional insights into the underlying factors affecting risk perception and nuclear choice, as well as correlations between risk perception and nuclear choices, we conducted

statistical analysis (logistic regression analyses and Chi-Square test). Table 3 below describes the variables of demographics, trust and public engagement that were employed in the logistic regression models.

[Insert Table 3 about here]

3.5.1 Factors underlying risk perceptions

Our results show that risk perceptions were affected by demographics, trust, and perceptions regarding public engagement. In relation to the demographic factors, we found that people are more likely to regard nuclear-related risks as being higher if they are women, are less educated, older, and have a higher income (Table 4).

Risk perception of nuclear energy is also affected by the perceived trustworthiness of the major energy decision-makers. Our results show that a lack of trust is associated with higher risk perception. Specifically, the lack of trust in the care attribute for the Hong Kong government, as well as a perceived lack of competence, and the credibility and openness of operators are all more likely to lead to perceptions of greater risks (Table 5). Among these trust factors, the care attribute in relation to the Hong Kong government (i.e. whether respondents perceive the Hong Kong government as paying sufficient attention to safeguard the well-being of the people) has the most influence on the likelihood of high risk perception, followed by the openness of plant operators. Our results suggest that the Hong Kong government and operators do play a significant role in shaping public perceptions of nuclear risk. This may reflect their direct influence in important areas of nuclear risk management including information disclosure, emergency planning and radiation monitoring.

The perception of public engagement also plays a role in shaping public risk perception. Our respondents had a higher risk perception if they perceived they had less access to comprehensive and balanced information through public consultation. In addition, perceptions of greater risk are more likely to occur if respondents attach a greater importance to public engagement, see a

greater need for public inputs, but have less time available to participate in public engagement (see Table 6). These findings suggest that it is the process, not just the mere provision of an engagement exercise, that is critical to managing risk perceptions. Appropriate mechanisms to ensure and facilitate public access to comprehensive and unbiased information in a nuclear consultation are of obvious importance.

3.5.2 Factors underlying nuclear choices

Demographics, trust, and perceptions about the form and process of public engagement are the factors determining choices about nuclear energy but with a slightly different dynamic when compared with the findings relating to risk perceptions. Our results show that men, people with fewer children, and people with a lower income tend to support nuclear as an option for electricity generation (Table 4).

In relation to trust factors, people's support for nuclear depends on their trust in the credibility and care dimensions of the Hong Kong government's position, as well as the care dimension of the Chinese government's policies and actions (Table 5). Our findings suggest that a high level of distrust in these three aspects is associated with greater opposition to nuclear energy. Based on the coefficients, the extent to which the Chinese government is regarded demonstrating care appears to be the most significant trust factor in affecting nuclear choices.

As regards the role of public engagement, our results indicate that while all five potential barriers to participation are seen as being quite significant (being identified by between 44.6% and 79.0% of respondents) (Figure 5), one specific factor, the perceived need for public inputs, is particularly influential. Our results show that respondents who believe that they can add value through their participation (i.e. that they do not agree that "government will do a good job without my inputs") tend to oppose nuclear energy (Table 6).

[Insert Table 4 about here]

[Insert Table 5 about here]

[Insert Table 6 about here]

3.5.3 Correlation between risk perceptions and nuclear choices

We further investigated the dynamics between risk perceptions and nuclear choices by employing the Chi-Square test. Our results show that there is a moderate relationship between risk perception and nuclear choice – the higher the risk perception one has, the higher the opposition one has to nuclear as an energy option for Hong Kong (see Table 7).

[Insert Table 7 about here]

It is important to note that this finding cannot however offer any confirmation of causal relationships between risk perceptions and nuclear choices although other literature does indicate that risk perception is one of the key factors affecting public attitudes towards nuclear energy (Accenture, 2008; Pidgeon et al., 2008; Sjöberg, 2004; Whitfield et al., 2009). Other potential factors affecting nuclear choices include environmental attitudes, awareness of climate change impacts, and concerns about energy security (Corner et al., 2011; Goodfellow et al., 2011; Greenhalgh and Azapagic, 2009). While our logistic regression and Chi-square analyses provide us with some insights into the potential dynamics between risk perceptions and nuclear choices, the applicability of these other potential factors in the Hong Kong context requires further investigation.

Our statistical analysis establishes connections between risk perception, demographics, trust, and nuclear choices and these are conceptualised in a model in Figure 7. Our model suggests that, firstly, demographic characteristics, trust, and perceptions of public engagement are the three

common factors that affect nuclear risk perceptions and nuclear choices in Hong Kong, and, secondly, there is a correlation between risk perception and nuclear choice. Correlation between variables, which does not suggest causational relationship, is marked in a dash line in Figure 7 while causational relationships are marked in solid lines.

We also found that these three factors affect risk perceptions and nuclear choices in different ways. For instance, the trust dimensions that matter differ in terms of risk perceptions and nuclear choices. While it is the perceived care of the Hong Kong government, and the openness, competence, and credibility of the operators that affects risk perceptions, another combination of trust dimensions (including the perceived care of the Chinese government, and care and credibility of the Hong Kong government) influences nuclear choices. This finding indicates the complexity of the trust dimensions of nuclear decision-making.

[Insert Figure 7 about here]

4 CONCLUSIONS AND POLICY IMPLICATIONS

This paper has explored an under-research field relating to the analysis of nuclear decision-making. We have focused on public attitudes towards nuclear energy by examining perceptions of nuclear risks, dimensions of trust in key stakeholders, and the efficacy of public engagement processes.

Our principal findings are:

1. Hong Kong people have divided and undecided views on nuclear choices. Respondents perceived quite a high risk of being exposed to nuclear radiation. Their concerns about nuclear energy are not limited to technological issues, but extend to economic, social, environmental, as well as regulatory concerns.

2. There appear to be high levels of distrust in relation to the dimensions of motives, transparency and competence. Respondents distrust all the key energy decision-makers in Hong Kong, including the Hong Kong and Chinese governments, utilities, and legislative councilors.

They in general have the greatest distrust in the motives and transparency of the Chinese government, Hong Kong government, and the nuclear power plant operators. However, they have relatively more trust in the competence of these parties.

3. Our results suggest that although public engagement is widely recognised as being important, the current process is not seen as being effective.

4. Our findings also provide additional insights into the underlying factors affecting risk perceptions and nuclear choices. Our analysis indicates that demographics, trust, and perceptions of the effectiveness of public engagement are the major factors that explain high risk perceptions and opposition to nuclear energy.

5. Our analysis contributes to the literature on trust by shedding further light on the complexity of the trust concept. Our conceptual model distinguishes and specifies dimensions of trust that are particularly influential in the contexts of risk perceptions and nuclear choices. The "care" and "credibility" dimensions are particularly important because these can affect both risk perceptions and nuclear choices.

6, We also highlight the rather distinctive central-local dimensions of trust that exist in the Hong Kong context. There are variations in the perceived trustworthiness of the Central, Guangdong and Hong Kong governments. While there is evidence of distrust in all three levels of government, respondents distrust the Hong Kong government less, at least in certain areas such as the likelihood of distorting facts.

Our findings have policy relevance in Hong Kong, particularly in the post-Fukushima context. The Fukushima experience indicates that transparency and openness of information, rather than withholding information from the public, is of the utmost importance in risk management (Kuo, 2013; NDJ, 2012). Our findings suggest that the Hong Kong government needs to ensure trust building receives as much attention as scientific and technological inputs in nuclear decision-making processes. Our conceptual model (Figure 7) specifies those dimensions of trust that can matter. "Care", "openness", "competence", "credibility" are the dimensions that affect risk

perceptions while “care” and “credibility” affect the acceptability of choices about nuclear energy. These findings reinforce the importance of openness and transparency in effective risk management as suggested in the literature (Frewer et al., 1996; Poortinga and Pidgeon, 2003).

Our second policy recommendation concerns the mechanisms through which public engagement can be better designed to enhance trust. Although an emerging body of the energy literature has suggested that public engagement can foster trust (see for example Adams et al., 2011; Glover, 2003), it is important to note that public engagement cannot be regarded as procedural solutions for public distrust (Aegerter and Bucher, 1993). Public engagement may further damage trust in some cases of nuclear development when engaging practices are perceived as a way to legitimise a government decision that has already been made (Mah et al., 2012a; Sirin, 2010). In consideration of the complexity involved in the relationships between public engagement and trust, the extent to which and how public engagement can foster trust are questions that require more study.

In this study, we have not ascertained the causation between public engagement and trust, and thus cannot answer the question to what extent public engagement can foster trust. But our logistic regression analysis does indicate that trust is a factor that can explain perceptions of greater risks and nuclear opposition. By specifying the trust dimensions that are important, our findings can provide insights about how public engagement can be better designed. Our findings suggest that the government may need to respond strategically to public concerns about the specific trust issues (including care, openness, and credibility) in its engagement exercises. Not distorting facts about nuclear energy, ensuring information transparency, and being seen to pay sufficient attention to safeguarding the well-being of Hong Kong people are clearly priority areas.

The Hong Kong government also needs to assume a more important role in managing nuclear risks. The Fukushima accident has exposed the undesirable consequences of relying too much on the Tokyo Electric Power Company (TEPCO) to manage nuclear risks (Kuo, 2013; NDJ, 2012). This potential problem of relying too much on the business sector to ensure nuclear safety is particularly relevant to Hong Kong. The philosophy of laissez-faire capitalism underpins the economy and many public policies. The Hong Kong government tends to rely on private sector

actors to lead the way and to shape major energy decisions (Lo, 2008). However, in relation to managing nuclear risks, there is indeed a need for the government to assume a more active role in it, and it can do so by building upon its comparative strength in certain aspects of trustworthiness. Specifically, it should enhance institutional trust to improve the efficacy of nuclear management. Institutional trust – the trust in institutions that regulate nuclear energy – has been extensively documented in the literature as a crucial element in effective risk management (see for example Poortinga and Pidgeon (2003), Whitfield et al. (2009)). One of the most interesting findings of our survey is that the Hong Kong government seems to be more trustworthy than the Chinese government, at least in some aspects. These findings suggest that the Hong Kong government can be more proactive, move away from narrow local perspectives, and collaborate with the governments in Beijing and Guangdong to strengthen the regulatory and information disclosure systems of the nuclear industry.

This discussion on the regional approach for managing nuclear risk is particularly relevant in the Hong Kong context because, as we have discussed, nuclear issues in Hong Kong are cross-border in nature. Due to the proximity to nuclear projects in Guangdong which is expected to implement its nuclear expansion plans, whatever Hong Kong's future nuclear choices (i.e. to expand or reduce the use of nuclear power, or to retain the current usage level) Hong Kong is and will continue to be exposed to a relatively high level of nuclear risks (Mah and Hills, 2013). In other words, scaling down the use of nuclear power in Hong Kong will not be the most effective way to mitigate nuclear risks to Hong Kong people. It is important to adopt a regional approach for ensuring nuclear safety in the entire region.

As well as acting as the bridge between the Chinese government and Hong Kong public, the Hong Kong government can also reach out and leverage civic capacity to enhance trust. Specifically, the government needs to give more thought to capacity-building among and within advisory committees, the epistemic communities, and environmental NGOs. These actors were perceived as more trustworthy by our respondents. In so doing, the government can enable civil society to play a more important role in engaging the public, and subsequently improve its own trustworthiness.

Finally, the scoping of issues in nuclear-related consultation exercises requires special attention. Our findings suggest that non-technical issues such as the disposal of radioactive waste that may involve ethical and value-laden issues are also of public concern. This implies that a narrow focus on technical, cost and carbon-reduction-potential issues that formed the basis of the 2010 Hong Kong consultation need to be broadened in future exercises to include environmental (such as long-term disposal arrangements for radioactive waste), ethical, and regulatory issues. This finding reinforces one of the key insights of the literature on public engagement that emphasises not only technical information, but also the explicit inputs of values, lay knowledge nad public perceptions of trade-offs are also important to effective public engagement (Abelson et al., 2003; Petts,2004).

Although this paper is based on a survey conducted in Hong Kong, our findings can, we believe, be generalised to other major cities which share the challenges of effective public engagement and trust building in relation to difficult energy choices. Our findings can also be generalised to some extent to other policies issues such as GM technology and the siting of controversial facilities such as new waste incinerators which also involve risk perceptions and trust in effective environmental governance.

While our study confirms that trust is a crucial element in effective nuclear decision-making, we have not be able to probe into why people trust or distrust institutions of government, the business sector or other social agencies. Some studies suggest that trust can depend on shared values, and confidence in persons, social relations and institutions such as the rule of law and accountability system (Braithwaite, 1998; Earle et al., 2010). The reasons why people trust or distrust a particular institution, party, or electricity utility are therefore important areas for future research. This study is primarily a quantitative research exercise. A multi-method study that combines quantitative surveys with qualitative focus groups and face-to-face interviews may generate complementary data that can advance our understanding of the complex concepts of risk perception, trust and public engagement and their interactions.

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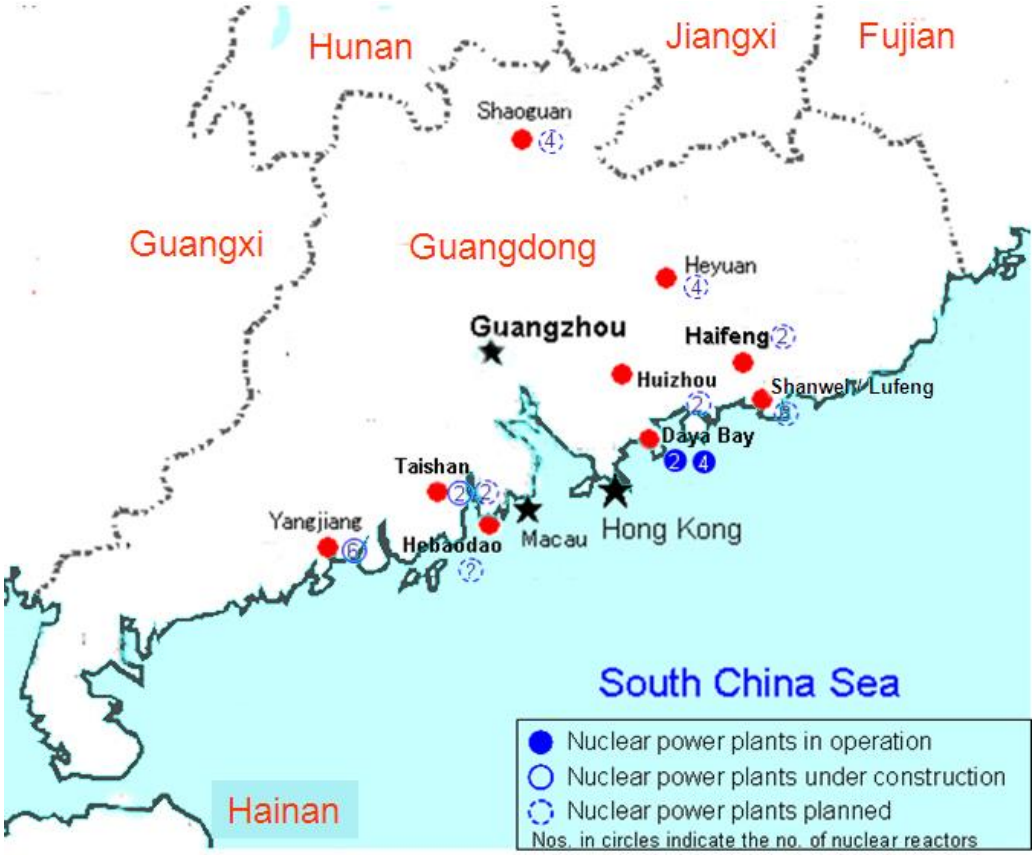
Figure 1: Nuclear power plants in Guangdong



Source: Map compiled by authors with data retrieved from WNA website http://world-nuclear.org (dated 8 August, 2013)

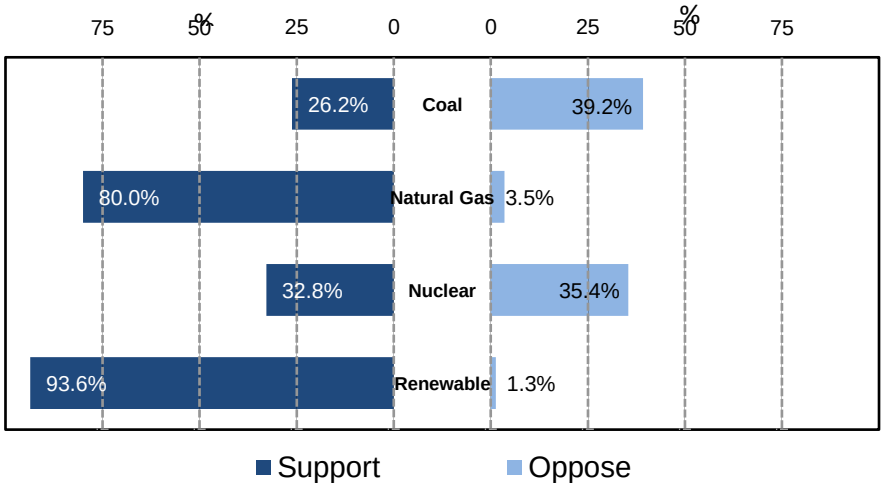


Figure 2. Summary of responses to the statement "To what extent do you support or oppose the use of the following fuels/technologies in electricity generation?" Responses are expressed as aggregate percentage of the "strongly support," "support," "oppose," and "strongly oppose" responses. For example, the 32.8% respondents reported to "support" nuclear energy in this figure include those who said that they "strongly supported" or "supported" nuclear energy. Similarly, 35.4% respondents reported to "oppose" nuclear energy in this figure include those who said that they "opposed" or "strongly opposed" nuclear energy. Detailed breakdown of the responses is available at the full survey report: http://www.kadinst.hku.hk/nuclear/files/Final_Nuclear_policy_English_report_20130718[1].pdf

Table 1: Selected demographic features by responses to nuclear choice

Demographic features		**Support nuclear**	**Half-half**	**Oppose nuclear**
Share of respondents		32.8%	28.0%	35.4%
Gender * (p=.000)**	Female	40.1%	71.7%	68.6%
	Male	59.9%	28.3%	31.4%
Monthly Income ($HK) * (p=.004)**	Less than $10,000	21.3%	22.5%	12.6%
	Between $10,001 and $30,000	49.3%	41.7%	22.3
	Between $30,001 and $50,000	14.7%	21.2%	22%
	Higher than $50,000	14.7%	14.6%	20.6%
Child * (p=.000)**	With one child or more	62.2%	73.6%	74.1%
	Without any child	37.8%	26.4%	25.9%
Age (p=.565)	<20	4.2%	4.2%	7.0%
	>60	24.3%	23.2%	21.0%
	20 - 29	11.1%	10.7%	15.4%
	30 - 39	6.3%	5.4%	9.8%
	40 - 49	20.1%	20.2%	13.3%
	50 - 60	34.0%	36.3%	33.6%

Remarks:

*(1) *** indicates <.01 significance level in chi-square test with p-value in the parenthesis*

(2) "Half-half" means that respondents partly agree and partly disagree, and they found it difficult to differentiate whether they agree or disagree more.

(3) 4% of our respondents stated that they "don't know", meaning that they have no idea how to make this decision.

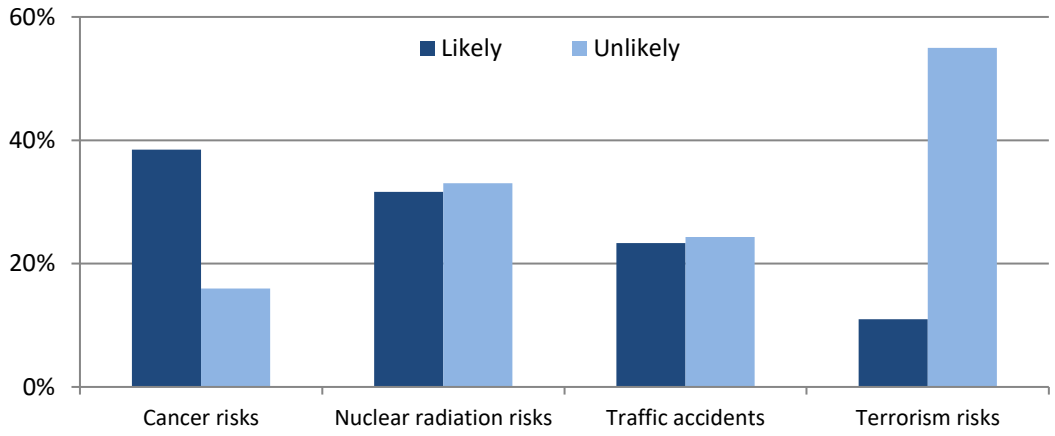


Figure 3: Summary of responses to the question "How likely do you think you would be exposed to the following risks within your or your childrens' lifetimes ?" Responses are expressed as the aggregate precentage of the "very likely," "likely," "unlikely," and "very unlikely" responses. For example, the 31.6% respondents reported to perceive it is "likely" that they and their children would be exposed to nuclear risks include those who said they perceived that it would be "very likely" or "likely" that they would be exposed to the risks.

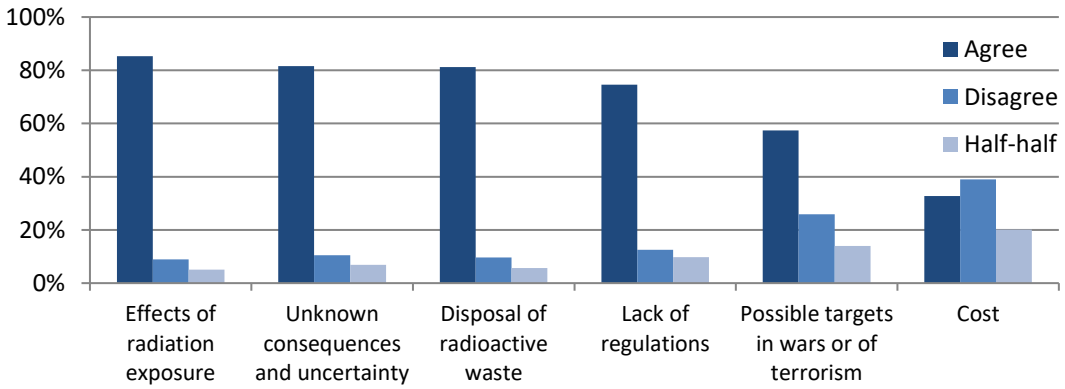


Figure 4: Summary of responses to the question "To what extent do you agree with the following statements?" (a) I am concerned about the effects of radiation exposure. (b) I am concerned about the disposal of radioactive waste. (c) I am concerned about the unknown consequences and uncertainty of the use of nuclear power (e.g. uncertainty over liability and compensation in cases of nuclear incidents if something like Fukushima happens again). (d) I am concerned about the cost of nuclear-generated electricity. (e) I am concerned about the lack of regulations on nuclear power. (f) I am concerned that nuclear power plants can be possible targets in wars or of terrorism. Responses are expressed as the aggregate percentage of the "strongly agree," "agree," "disagree," and "strongly disagree" responses. For example, the 85.3% respondents reported to "agree" that they were concerned about the effects of radiation exposure include those who said that they "strongly agreed" or "agreed" with the statement.

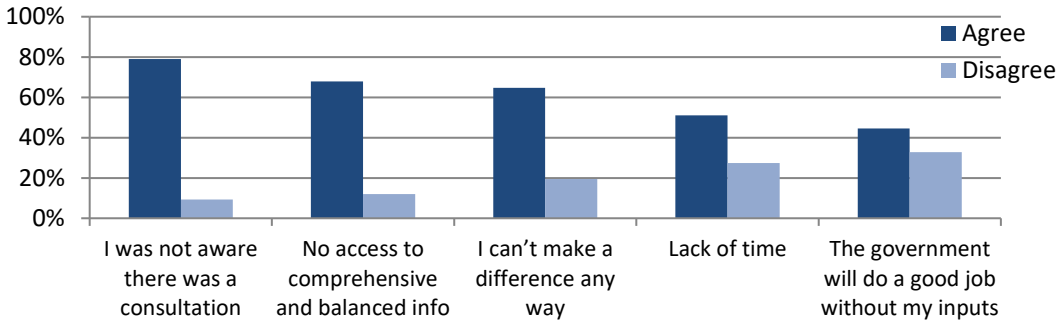


Figure 5: Summary of responses to the question "To what extent do you agree with the following statements?" (a) I did not have access to comprehensive and balanced information for meaningful participation. (b) I can't make a difference any way. (c) I can't afford the time. (d) The government will do a good job without my input. (e) I was not aware there was a consultation. Responses are expressed as aggregate percentage of the "strongly agree," "agree," "disagree," and "strongly disagree" responses. For example, the 79.0% respondents reported to "agree" that they were not aware there was a consultation include those who said that they "strongly agree" or "agree" with the statement.

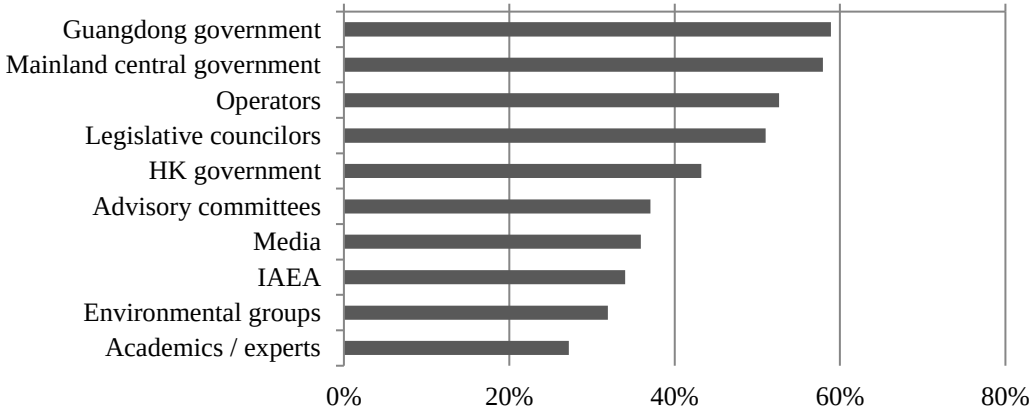


Figure 6. Summary of responses to the question "To what extent do you agree or disagree with the following statement: "I have concerns about nuclear energy because I don't trust …" (a) Academics/ experts. (b) Environmental groups. (c) Media. (d) Advisory committees related to energy and environment. (e) Mainland central government. (f) Guangdong government. (g) Hong Kong government. (h) Legislative councilors. (i) Operators. (j) International Atomic Energy Agency. (Expressed as aggregate percentage of "strongly agree," and "agree" responses).

Table 2: The key dimensions, attributes and indicators of trust

Dimensions of trust	**Attributes**	**Indicators**
Distrust in motives	Integrity	The party is unable to stand firm on the principle of acting in the best interest of the people of Hong Kong because it has its own vested interest
	Care	The party does not pay sufficient attention to safeguard the well-being of the people in its decision making on nuclear energy
	Fairness	The party makes decisions on nuclear energy in biased ways and fails to balance the interests of different stakeholders (e.g. government, industry and the general public) in society
Distrust in transparency	Openness	The party fails to make all the relevant information accessible to the public to facilitate an informed debate on nuclear energy
	Credibility	The party distorts facts about nuclear energy
Distrust in competency	Competence in terms of professional knowledge and technical expertise	The party lacks professional knowledge and technical expertise to regulate and manage the use of nuclear energy effectively
	Reliability	The party is inconsistent in its position on nuclear energy

(Sources: Braithwaite (1998); Coleman (1990); Denhardt (2002); Frewer et al. (1996); Hardin (1996); Mayer et al. (1995); Poortinga and Pidgeon (2003); Upham and Shackley (2006); Walker et al. (2008))

Table 3. Definition of variables

Dependent variable	**Description**
Risk perception	Respondent's view on the likelihood of him/her and children being exposed to nuclear radiation; on the scale of 1 (likely) to 3 (unlikely)
Nuclear choice	Respondent's position on nuclear as fuel for electricity generation; on the scale of 1 (support) to 3 (oppose)
Independent variable	**Description**
Gender	Dummy variable gives "1" to male, and "0" otherwise
Income	Median of seven groups of income range in HKD 1,000
Age	Age of respondent in years
Child	Number of children of respondent
Education	Categorized as "1" for primary or below, "2" for secondary, "3" for matriculation, "4" for Tertiary non-degree, "5" for Degree, and "6" for Post-graduate or above
Place of birth	Five dummy variables, which give "1" to different places of birth – Hong Kong, mainland China, Taiwan/Macau, southeast Asia, and other
Utility	Dummy variable gives "1" to customer of China Light and Power, and "0" otherwise
Competence	Three variables on respondent's trust in the competence of Hong Kong, Chinese governments and operators; "1" indicates the least trust and "3" indicates the most trust
Credibility	Three variables on respondent's trust in the credibility of Hong Kong, Chinese governments and operators; "1" indicates the least trust and "3" indicates the most trust
Reliability	Three variables on respondent's trust in the reliability of Hong Kong, Chinese governments and operators; "1" indicates the least trust and "3" indicates the most trust
Integrity	Three variables on respondent's trust in the Integrity of Hong Kong, Chinese governments and operators; "1" indicates the least trust and "3" indicates the most trust
Care	Three variables on respondent's trust in the care of Hong Kong, Chinese governments and operators; "1" indicates the least trust and "3" indicates the most trust
Fairness	Three variables on respondent's trust in the fairness of Hong Kong, Chinese governments and operators; "1" indicates the least trust and "3" indicates the most trust
Openness	Three variables on respondent's trust in the openness of Hong Kong, Chinese governments and operators; "1" indicates the least trust and "3" indicates the most trust
Importance of public engagement	Respondent's view on public engagement as important tool of nuclear policy-making; "1" indicates important and "3" indicate unimportant
Access to information	Respondent perceives lack of comprehensive and balanced information provided as barrier to public engagement; on the scale of 1 (agree) to 3 (disagree)
Time and availability	Respondent perceives lack of time as barrier to public engagement; on the scale of 1 (agree) to 3 (disagree)
Needs for public inputs	Respondent's view on the needs for public inputs in consultation; "1" indicates necessary and "3" indicate unnecessary

Note: the questionnaire used to obtain these variables is included in Appendix 1.

Table 4. Logistic regressions of demographic factors influencing high risk perception and support for nuclear

Variable	Risk perception	Nuclear choice
No. of observations	408	408
McFadden pseudo R^2	.042	.033
Intercept for response = "1" (agree/support)	-.8288*	-.226
Intercept for response = "1" (agree/support) or "2" (half-half)	.7686	1.1456***
Gender	-.7555***	.6674***
Income	.0177***	-.014***
Age	.0116*	
Child		-.2858***
Education	-.2105***	

***p <0.01, ** p <0.05, and * p-value <0.1
Only significant variables are presented here.

Table 5. Logistic regressions of trust factors influencing high risk perception and support for nuclear

Variable	Risk perception	Nuclear choice
No. of observations	501	501
McFadden pseudo R^2	.053	.054
Intercept for response = "1" (agree/support)	.582**	-2.5425***
Intercept for response = "1" (agree/support) or "2" (half-half)	2.2005***	-1.0732***
Credibility of Hong Kong government		.2456**
Care of Hong Kong government	-.5763***	.3002**
Care of Chinese government		.4333***
Competence of operators	-.2985***	
Credibility of operators	-.2848**	
Openness of operators	-.4409***	

***p <0.01, ** p <0.05, and * p-value <0.1
Only significant variables are presented here.

Table 6. Logistic regressions of public engagement factors influencing high risk perception and support for nuclear

Variable	Risk perception	Nuclear choice
No. of observations	504	504
McFadden pseudo R^2	.021	.031
Intercept for response = "1" (agree/support)	-.0623	.2951
Intercept for response = "1" (agree/support) or "2" (half-half)	1.4737***	1.692***
Importance of public engagement to nuclear policy-making	-.2786**	
Access to comprehensive and balanced information	-.2834**	
Time and availability to participate	-.2592**	
Perceived Needs for public input	.2593***	-.5638***

***p <0.01, ** p <0.05, and * p-value <0.1
Only significant variables are presented here.

Table 7. Chi-Square test results on risk perception and nuclear choice

	High risk perception	Half-half	Low risk perception
Support nuclear	6.1%	10.5%	16.1%
Half-half	9.0%	14.3%	8.5%
Oppose nuclear	16.6%	10.5%	8.4%

Chi-Square Phi: 0.3087 (p < .0001)

Figure 7. The connections between risk perception, demographics, trust, and nuclear choice: a conceptual model