

Perception of Risk towards Nuclear Energy in Taiwan and Hong Kong

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Abstract

This article investigates the differences in the public reaction to the Fukushima disaster in Taiwan and Hong Kong, focusing on the public's perception of risk. This study shows that in both places weaker groups, such as civil society opposition groups and activists, have fewer outlets to disseminate their ideas and are thus easily overpowered by dominant ideologies pushed forward by pro-business groups and governments. Nevertheless, a closer look at local specificities will bring to light significant differences between social activists' and the general public's perception of risk in relation to nuclear energy in Hong Kong and Taiwan. While there is widespread opposition to it in Taiwan, in Hong Kong there seems to be no or only muted resistance.

Introduction

The degree to which there is public acceptance of nuclear power differs from country to country, depending on the historical background. While the Fukushima Dai-ichi incident has sparked numerous reactions both in the West and in Asia, it is in Asia that the majority of governments have decided to forge ahead with their plans for nuclear expansion.

Taiwan in particular is in a similar situation to Japan: it is a seismic, densely populated country with nuclear power plants located side by side to urban centers and in close proximity to numerous underwater volcanoes (Chao 2012). While many people, especially in the aftermath of the Fukushima incident, were hoping for a future nuclear-free Taiwan (非核家園), presidential elections in January 2012 have crushed such dreams as newly re-elected President Ma Ying-Jeou firmly stated that the construction of the controversial Nuclear Plant Number 4, located in Longmen, northeast of Taipei (核四 or NPP-4, as the project is known inside Taiwan) will go on as planned (J. Tsai 2012). Recent polls (*Apple Daily* 2012; Chang 2012: 8) and previous reports (*Women de Dao* 2003) have demonstrated that nuclear safety was among Taiwanese citizens' top concerns in the past decade. The extent of interest in this issue is highlighted by increasing media attention, particularly in the aftermath of news-magnet incidents such as the Fukushima Daiichi meltdown (*Women de Dao* 2011a, 2011b; Fang 2012: 8; I-C. Lee 2012a, 2012b, 2012c).

In Hong Kong, citizens and activists worry most about something happening to the *Daya Wan* plant (大亞灣核電廠), which is located in close proximity to the city in neighboring Shenzhen. However, while the Fukushima disaster has also left a mark in Hong Kong, the public perception of risk¹ and social movements' views and tactics vary greatly from those of their Taiwanese counterparts.

The present article aims to analyze the debate that has taken place in Taiwan and Hong Kong around nuclear energy issues in the aftermath of a catastrophic event which has led many governments to reconsider their stance towards this technology. The article will also take into consideration the role of the State and media outlets in disseminating crucial information and influencing public opinion and perception of risk; furthermore, it will analyze the strategies employed by anti-nuclear activists to make their concerns widespread. This article examines nuclear safety problems in Taiwan and Hong Kong in light of Ulrich Beck's theory of the risk society (Beck 1986), showing that perception of risk is not one-dimensional but that there are different aspects of risk: risk of death, risk of long-term genetic damage, risk of contaminated soil and food products, and so on. Findings are then utilized to better assess what prompts people to fear or support nuclear technology. The present article is based on a mixed body of data, including case studies by medical professionals (in the case of nuclear waste dumped on Orchid Island), surveys by governmental agencies and researchers, investigative reports and news articles in printed and online media, and ethnographic first-hand evidence obtained via interviews and participant observation during a prolonged 10-month fieldwork period.²

Theory of Risk Society

Nuclear energy and the perception that it comes with the risk of massive disasters has become a focal point of public opinion, academic research and state regulation throughout the world. Beck argues that the notion of risk is a by-product of modernity and represents a novel kind of psychological state affecting numerous people living in postindustrial societies. While in traditional societies individuals led their lives according to the belief that dangers and hazards were 'acts of God' or of some other force higher than humanity, industrial modernization and its technological and scientific advancements have brought with them the knowledge and awareness that risk can be calculated and predicted in advance, and thus avoided. In the postindustrial stage of society, risks associated with the

¹ 'Risk perception' is the subjective judgment that people make about the severity of a risk. The phrase is most commonly used in reference to natural hazards and threats to the environment or health, such as nuclear power.

² I conducted 14 in-depth interviews in Taiwan and Hong Kong on individual perceptions and moral beliefs about nuclear energy and the location of power plants, all the while collecting personal accounts in both locations of individuals and associations involved in the circulation and spread of the notion of risk in relation to nuclear energy. Five of my Taiwanese interviewees were NGO members, one was a medical examiner expert in radiation hazards, and one was a Canadian diplomat and long-time connoisseur of the island. As for Hong Kong, two interviewees were members of a think tank, two were NGO members, one was a Dutch politician and activist and two were university professors.

advancements in those same technological and scientific fields have brought about unplanned consequences that threaten humanity. Unlike natural hazards that plagued ancient civilizations, contemporary risks usually have no boundaries, expanding across wide spatial and social borders. This increasing awareness of risk has started to reshape how we think, behave and engage in politics, marking the arrival of a second modernity in which the emergence of the 'risk society' occupies a prominent space (Beck 1986, 2009). Hong Kong and Taiwan – and Taiwan especially, due to its rapid development from a pre-industrial society to a postindustrial society – provide interesting examples of how these novel kinds of risks become part of everyday life.

Taiwan

Nuclear Energy in Taiwan

Currently, Taiwan has six operating nuclear power reactors (based at three power plants), which are operated by the state-owned company Taipower (Figure 1).³ Construction of the first unit began in 1972, and it was expected that each unit would have a 40-year lifespan. Two advanced reactors, currently under construction at what will be Taiwan's fourth nuclear power plant, in Gongliao district, will bring



Figure 1: Taiwan's NPP-3, Kending's National Park
(© Simona Grano)

³ The Taiwan Power Company (*Taiwan Dianli Gongsì* 台灣電力公司) is a state-owned power company that provides electricity to Taiwan and the offshore islands of the Republic of China. It is overseen by the Ministry of Economic Affairs.

total capacity to eight. The plant's construction, now in the final stages, began in 1997 but has been marred by controversy, public opposition, and a host of delays from the beginning.

Scholars of Taiwan's anti nuclear movement have traditionally sought to explain opposition through the study of politics (Tang and Tang 1997; M.-S. Ho 2003, 2005; Lyons 2009; Jobin 2010: 47, 2012: 2). The first three nuclear power plants were all built before the end of martial law, and thus there was little or no concern about environmental repercussions or public opinion (Lupke 2012: 156). The fourth plant, in contrast, has been under attack from organized opposition island-wide, and has come to symbolize civic society's fight against nuclear energy. In fact, due to Taiwan's particular history, once martial law was abolished in 1987 – creating numerous outlets to vent discontent, such as newspapers, television programs, public protests – many previously repressed social movements and political opponents of the regime chose the anti-nuclear cause as their stronghold from which to attack the state (Shih 2012). Coincidentally, this was also in the wake of the Chernobyl disaster of 1986, and numerous intellectuals started to question state policies and possible environmental damage arising from hasty and careless development in the energy and economic sectors.

NPP-4: A Political Controversy

The KMT government announced its intention of building a fourth nuclear power plant in the 1980s (Lupke 2012: 159–160). The project was nearly cancelled twice; individuals involved in its planning and construction have ended up in jail following corruption accusations and at least one person has been given a life sentence. However, the project, although clouded in political and corruption scandals, is forging ahead and is currently at the stage at which the activation of the two reactors is being carried out. The saga of NPP-4 is widely known among the general public in Taiwan as its story, depicted in detail by the media, has been dissected virtually from every possible angle, from journalistic reportages on the television show *Our Island* (Women de Dao 2011a) through to protests taking the form of politically dissenting documentaries such as *Gongliao: how are you?* (貢寮你好嗎?) by Tsui Su Hsin, Secretary General of the Green Citizens Action Alliance (*Lüse Gongmin Xingdong Lianmeng* 綠色公民行動聯盟).

Since the very first planning stages, which was at the time when political liberalization and democracy were slowly settling in (after 1987), protests clustering around the Gongliao plant came to be characterized by a unique mix of elements from political power, public involvement, local and central government friction and grassroots activism that would have been repressed in Taiwan only a few years earlier (Lupke 2012: 157).

In the 1990s, public opinion was quite informed about nuclear issues (Jobin 2012: 2) and risk perception was quite high. The lifting of martial law gave activists more room for maneuver; the Chernobyl incident and its aftermath had massive reverberations; and in 1996 a Green Party was formed in Taiwan. By comparison, in the following decade (2000–2008) green movements became 'institutionalized' following the Democratic Progressive Party's (DPP) electoral success (M.-S. Ho 2005: 405; Jobin 2010: 49). With green movements becoming quieter on nuclear energy, and the lack of any serious nuclear accidents at this time, citizens became

less informed and thus their perception of risk decreased. The Fukushima Daiichi event, in all of its drama, has had the effect of giving new impetus to the no-nuke movement all over the world.

Currently, Taiwanese anti-nuclear activists' main goal is to halt the construction of NPP-4. To achieve their goal, they employ the powerful imagery of death evoked by the Fukushima Daiichi incident, presented as an example of what could happen on Taiwanese soil if the project is completed (Interviews with Tsui, Xu and Lai). In terms of risk perception, opponents of nuclear power focus on the elevated risks associated with an earthquake in a highly seismic country such as Taiwan; this aspect is particularly worrisome considering NPP-4's location in the immediate vicinity of over fifty schools, at a distance of 40km from the capital, and within a radius of around a hundred underwater volcanoes, a few of which are still active (Chao 2012). Second, poor management on the part of government bureaus and Taipower regarding the nuclear waste facility on Orchid Island, where numerous leaks have caused radioactive material to seep into nearby sea and land, has increased public mistrust towards the authorities regarding nuclear technology-related issues (Chung 2005; Loa 2012a, 2012b). In Orchid Island, unverified rumors of stillborn infants and birth defects have increased exponentially, although few medical studies up to now have supported these statements in a consistent manner (Interviews with Chang and Voyer; Arrigo *et al.* 2000; Loa 2012c).

A third problem affecting Taiwanese citizens and activists' perception of risk concerns the management of NPP-4 (J. Tsai 2011). Although the managing contractor is General Electric (GE), the turbines in the reactors are contracted to Mitsubishi and other parts of the reactors are subcontracted to GE's Japanese partners, Hitachi and Toshiba (Power Technology n.d.). A common fear among anti-nuclear activists is that, given the numerous companies that have a stake in the project, should something happen, no one would take responsibility (Interviews with Xu and Lai). Activists often engage the media to highlight the numerous incidents and delays that have marred the construction of NPP-4 so far (Pan 2012: 8). While the plant was initially supposed to be completely computerized, the project has taken so long to build that the sophisticated technology it was based on is now obsolete. Due to the numerous developers involved, and the technological advancements of the past 20 years, several reactor components are now difficult to find or are simply incompatible with newer parts, causing anger and concern among the public (Interviews with Xu and Pan). Further, this is the first plant that Taipower has built in its entirety; the company previously restricted its role to the management of nuclear facilities after other companies (such as General Electric or Japanese companies) had carried out the actual construction. Media reports and several of my informants have reported rumors such as electric cables chewed by rats (Interviews with Xu and Pan; J. Tsai 2011) and the substitution of critical components with plastic parts unable to endure exposure to high temperatures (Interview with Xu). Such scandals, which have been made highly visible by media outlets politically close to opposition parties, have contributed to a rapid decline of social trust, which has far-reaching social and political ramifications.

Public Perceptions towards Nuclear Power (Before and After Fukushima)

While everybody in the 'green' camp (by which I mean green NGOs and the Green Party)⁴ explicitly emphasizes the link between nuclear energy and one of the biggest disasters in Japanese history, displaying an utter and complete rejection of nuclear energy (Interviews with Tsui, Xu, Lai and Pan, among others), citizens in general take a more practical stance: as demonstrated by numerous polls, nuclear safety was among Taiwanese citizens' top concerns both before and after Fukushima (*Apple Daily* 2011; *Women de Dao* 2011a, 2011b). In a survey of public perceptions of technological risks conducted by Chen Dung-Sheng in 2009, 74.5 percent of respondents thought that nuclear waste affected the health of humans, and 71 percent agreed that nuclear technologies pose unknown risks to both the environment and to mankind (Chen 2011: 570).

A few opinion polls carried out after Fukushima showed a clear division reflecting political orientations. While the *Liberty Times* suggested that anti-nuclear feelings were predominant among its readership, with more than 92 percent of respondents fearing the risks posed by nuclear plants, the *China Times*, which is sympathetic to the KMT, reflected opinion on the other side of the political spectrum which showed that 57 percent of the people agreed with President Ma's stance on nuclear energy (as quoted in Jobin 2012: 12).

It is also important to be aware that while the majority of Taiwanese are more anxious about nuclear accidents since Fukushima, when asked whether they would be willing to pay higher energy prices for a 'nuclear-free home' (Y.-W. Tsai 2011), not many declare themselves willing to forsake nuclear power immediately, and instead want to defer the decision to future generations (Interviews with Tsui and Lai). An island-wide survey carried out by the Taiwan Environmental Protection Union (TEPU) in 2000 had found that 42 percent of the people think nuclear power should be gradually phased out; 32 percent think of it as 'safe and necessary' for the country's energy survival, while 21 percent consider it 'unsafe but necessary', thus clearly illustrating the ambivalent feelings displayed by many Taiwanese in regards to nuclear energy, even more so in the pre-Fukushima period.

Before the presidential election of 2000, when for the first time a member of the opposition DPP became President, the hope that NPP-4 would be shelved was solid. Nowadays, however, it is only the Green Party that takes seriously the possibility of stopping construction (Jacobs 2012). In 2008 the KMT regained the presidency, and in January 2013 it launched the idea of a popular referendum on the issue. This sparked numerous heated discussions within political parties and among Taiwan's citizens (Fell 2013), and it was recently deferred to a later time.

Finally, it is important to stress that nuclear safety problems are complicated because they pose different risks to society as a whole: perception of risk consists of more than the one dimension of high vs. low, with aspects such as risk of death and long term genetic damage, to 'secondary issues' such as contaminated food and radioactive products. In Taiwan, perception of risk towards these kinds of 'by-

⁴ In Taiwan, the phrase 'green camp' traditionally indicates the DPP, in contrast with the KMT 'blue camp'.

products' seems to be higher (*Women de Dao* 2012b; Interview with Chen) than the risks associated with the possibility of an actual disaster taking place on Taiwanese soil, especially considering the high quantities of food imports coming from Japan.

Anti-Nuclear Activists' Perception of Risk towards Nuclear Power

In the aftermath of the nuclear meltdown in Japan, numerous civic groups such as the Green Citizens Action Alliance, TEPU, legal aid groups such as Wild at Heart Legal Defense Association and political groups and parties such as the Green Party of Taiwan have found new vigor to fight an issue that had been dormant for a while (Interviews with Tsui and Pan).

Massive protest parades were organized for 30 April 2011, less than two months after the disaster. These were extremely successful, due to the high degree of emotion generated by the terrible images of people dying in Japan; such was the turnout that a new name was coined to describe the parades: the 430 Movement (430 行動). The Green Citizens Action Alliance is particularly active in organizing events and activities popularizing the anti-nuclear banner, including protests (Figure 2), rock concerts (Figure 3) and numerous public conferences, which have contributed to an increased public mistrust both of Taipower and of the government, and which have raised awareness of the risks connected to nuclear energy.



Figure 2: No-Nuke protest, 5 November 2011
(© Simona Grano)



Figure 3: No-Nuke Concert, 5 November 2011
(© Simona Grano)

On the other hand, Taiwanese are also aware that Taiwan's energy output is not adequate for today's needs (Lupke 2012: 159). Green activists, however, maintain that Taipower spreads misleading information by emphasizing Taiwan's lack of energy resources (Interviews with Tsui and Lai); in response, the activists argue that since 2009 the electricity back-up capacity has remained at a steady 20–30 percent – although it is not clear if this estimate also takes into account the different requirements of daily and seasonal peak demand. In Tsui Shu-Hsin's words:

Even if all three operational nuclear plants were to cease operation, our back-up capacity would still remain at about 20.9 percent. It is a myth that nuclear power is indispensable. Taiwan's electricity supply is sufficient without nuclear power; the so-called supply crisis is premised on huge economic growth in future decades, which will not lead to insufficient supplies but to a reduced back-up capacity (at perhaps above 10 percent). We need to look beyond these threats.

(Interview with Tsui)

Environmentalists maintain that energy costs are too low and should be increased so as to reduce waste (Interviews with Tsui, Xu, Lai and Pan).

It is a fact, though, that Taiwan is an island geographically isolated from other countries that can provide energy sources, and could suffer from energy restrictions if no suitable substitute for nuclear power is found (J. Lee 2012).

On the day he was invested for a second term as President, Ma Ying-jeou stated that no one inside Taiwan is opposed nuclear energy (*Mei you ren fan he* 沒有人反核). In response, anti-nuclear activists collected 15,000 signatures, composed a huge banner with the names of the signatories, and brought it to the Presidential Palace to confront Ma Ying-jeou. They chanted a slogan: '*Wo shi ren, wo fan he* 我是人，我反核！' ('I am someone, I oppose nuclear energy!') (Ma 2012).

In light of the above-mentioned data, it is safe to conclude that while Taiwanese citizens display a practical attitude towards nuclear energy and its risks vs. its benefits, social activists express a total and absolute rejection.

Hong Kong

The Anti-Daya Bay Controversy

Hong Kong has no nuclear power plants located inside its borders; however, 'it has been buying electricity from the Daya Bay nuclear plant across the border with China since 1994, which currently meets 23% of the city's need' (Loh 2012a).⁵ From its very beginning, the plant has provoked strong opposition inside Hong Kong, mainly from politicians belonging to the pro-democracy camp, such as Martin Lee and Szeto Wah.

In 1985–1986, when discussion about building the plant started in earnest, strong opposition in Hong Kong hinged predominantly on the concerns people had about its location, in the immediate vicinity of the city. Citizens were aware of the risks connected with this kind of technology in case of a nuclear accident. Right after Chernobyl, which contributed to the ignition of social protests against the construction of Daya Bay inside Hong Kong, social groups were able to exploit the mounting fears associated with nuclear power – together with uncertainty over Hong Kong's future – to their own advantage by organizing numerous petitions and protests. As emphasized by Greenpeace⁶ senior campaigner Prentice Koo, Hongkongers did not question nuclear technology *per se* but rather had objections about the location of the plant and its management (Interview with Koo). The debate was initially concerned with whether China had the ability to manage such a facility and whether there was a need for it, but then quickly became politicized and polarized along a 'pro-PRC/business interests' camp on the one hand and a 'liberal oriented/middle-class/intellectual' camp with pro-environmental sympathies on the other (Chiu *et al.* 1999: 63). The Anti-Daya Bay movement solicited more than one million signatures in a big campaign, but its leaders then retreated from high-profile environmental protests and turned to other rising issues of political and social discontent. In particular, following the Tiananmen Square Incident in 1989, Hong Kong's social movements shifted their focus to issues around political

⁵ Daya Bay is 25 percent owned by Hong Kong-listed CLP Holdings, which buys about 70 percent of the plant's output to supply Hong Kong's power needs.

⁶ Greenpeace HK was established in 1998. Due to Guangdong's symbolic status as the first province to have developed, with the second highest GDP of China, GP HK focuses mainly on local problems such as nuclear plants and air quality issues like climate change. GP HK cooperates with the non-official NGO (registered as a company) Greenpeace Beijing (Interview with Tan).

liberalization such as protecting freedom of speech and other rights, which were deemed to be more urgent concerns in the light of Hong Kong's imminent return to China less than a decade ahead.

Thus, after the Guangdong Nuclear Power Plant Joint Venture Company signed a contract with British and French suppliers, nuclear fears and the Daya Bay plant were forgotten, and when the plant was eventually connected to the energy grid few voices of protest were heard (Interview with Koo). Concerns were aired in 1995, after major inspections at Daya Bay in April of that year led to the plant being temporarily shut down (Chiu *et al.* 1999: 87), but other than that the discussion around nuclear power gradually lost importance.

However, in the aftermath of the Fukushima accident, the Special Administrative Region (SAR) government has put forward a proposal to increase reliance on nuclear energy at a time when numerous governments around the world have reconsidered and shelved their nuclear plans. The plan was unveiled in September 2011, when authorities released the long-awaited 'Hong Kong's Climate Change Strategy and Action Agenda', which recommended that the best way to reduce carbon emissions would be to raise the nuclear power share from 23 percent to 50 percent of the energy mix (Interviews with Koo and Kilburn).

According to Christine Loh, Hong Kong, as an importer of nuclear energy and not a producer, has to decide whether to be a passive player or whether to start playing a proactive role in terms of safety as an importer and consumer of nuclear energy; this is especially important in light of its geographical proximity to Guangdong province, where China is planning a host of new plants (Loh 2012b).⁷ 'Hong Kong', in Christine Loh's words, 'cannot avoid taking a position on nuclear energy because it is already a major nuclear user, although this fact is not appreciated by many people' (Loh 2012b: 9). She observes that 'Guangdong, Hong Kong's neighboring province, has several reactors already functioning and is planning several more. In case of a nuclear accident Hong Kong and its 7 million citizens could be affected' (Loh 2012c: 5).

Social Movements' Perception of Risk and Nuclear Technology

While in Taiwan it is almost a necessary trait for NGOs and social groups to be seen as 'anti-nuclear' (Interviews with Lai and Pan), in Hong Kong social movements and think tanks hold conflicting opinions. As aptly put by Paul Jobin:

This is probably the most salient and interesting difference between Taiwan's and HK's environmental NGOs. In the latter, social groups seem to be somewhat influenced by famous British environmentalists turned pro-nuclear such as George Monbiot, James Lovelock or Mark Lynas.

(Paul Jobin, personal communication, 24 October 2012).⁸

⁷ Dr Christine Loh Kung-wai is a former Hong Kong Legislator and the former CEO of Civic Exchange, a Hong Kong think tank that she co-founded in 2000. As of 12 September 2012, she has held the post of Under-Secretary for the Environment in the HKSAR Government.

⁸ I am grateful to an anonymous reviewer for pointing out that Hong Kong, as a former British colony, has been influenced by the shift that has taken place in the United Kingdom

Nevertheless some NGOs, such as Greenpeace, are staunchly opposed to nuclear and to the energy policy put forward by the SAR government for the next seven years: ‘

We believe there is absolutely no need to increase our share of the energy mix derived from nuclear; it would be sufficient to restructure the energy market in HK – a monopoly in the hands of a few private corporations – making it more efficient and allowing access to third actors, while reforming the pricing system.

(Interviews with Koo and Tan)

Other social groups and think tanks, such as Civic Exchange⁹ and Friends of the Earth, maintain a more cautious approach, organizing conferences and workshops aimed at spreading awareness of nuclear risks and benefits among the general population (Interviews with Kilburn and Ng). In fact, social groups’ attitudes towards nuclear power in Hong Kong vary, from perceiving nuclear power as a risk (Greenpeace and a few other radical but ineffective groups) to outright support for it in light of a lack for better alternatives for solving the city’s worsening air quality situation (Loh 2012c; Interview with Zimmerman). As Mike Kilburn, Head of Environmental Strategy of Civic Exchange until September 2012, said to me in an interview: ‘some people became in favor of nuclear energy after Fukushima’. According to the non-profit Clean Air Task Force, 10,000 people have died of cancer a result of Chernobyl, the world’s biggest nuclear accident, but pollution from coal plants was responsible for more than 13,200 deaths in 2010, and is the cause of 20,000 heart attacks per year (Schneider and Banks 2010). Many in Hong Kong share a similar position: some social groups (this certainly holds true for Civic Exchange) do not seek to propagate or promote a specific attitude towards nuclear, whether pro or con: ‘What we seek to do is to inform the public by offering seminars, lectures and scientific research papers from experts aimed at improving knowledge of certain issues among the general population’ (Interview with Kilburn).

Civic Exchange is not alone; I have spoken to numerous activists and academics involved with environmental activism in Hong Kong and many of them are of the opinion that, considering the city’s abysmal performance in terms of improving air quality standards,¹⁰ nuclear energy could offer a viable – albeit partial – solution to Hong Kong’s worsening air pollution (Interviews with Kilburn, Ng and Lee). Nuclear power to diminish fossil-fuel dependency and to decrease GHG emissions has become increasingly discussed as air pollution in Hong Kong has reached

after 2006, among experts and the general public, favoring pro-nuclear stances (Doyle 2011).

⁹ It should be noted that Civic Exchange is an independent policy research think tank established in 2000, which aims at conducting research and publicizing results in order to spread civic awareness among the community. It contributes to debates by undertaking research on a plethora of developmental, social and environmental issues.

¹⁰ Hong Kong’s air quality standards date back to a 1987 regulation which is deemed too outdated to be of any effectiveness in fighting the city’s air pollution problems.

saturation levels: on 2 August 2012, the Air Pollution Index (API)¹¹ hit an all-time high score for concentrated levels of Particulate Matter 2.5.¹² A point stressed by many of my interviewees is that since no death has been directly linked to the Fukushima nuclear meltdown, this form of energy looks safer than fossil-fuel related energy mixes, which after persistent exposure lead to permanent health problems (Interviews with Kilburn, Ng and Chau). This debate over whether nuclear energy is preferable to the release of more hydrocarbons that cause global warming is not confined to Hong Kong, but is a hotly-debated issue in numerous environmental circles around the world.

Even among those NGOs with a stance of radical opposition to nuclear power, there seems to be a tacit agreement that aggressive behavior should be avoided to prevent public distrust. In the words of Melonie Chau, Senior Environmental Affairs Officer for Friends of the Earth HK:

To some extent we can say that people in Hong Kong do not want to be involved in politics too closely. They tend to consider any kind of protest as having ulterior political motives and are wary of activities which are even remotely connected to politics. In order to advance our goals in the interest of society, we have to avoid being perceived as a political force, because these are often seen as dirty and corrupt.

(Interview with Chau)

The main reason that Hong Kong's NGOs are not antagonistic is because they want to be perceived as 'non-political' and 'non-radical', and as 'having absolutely nothing to do with political parties' (Interview with Chau). On the other hand, a complete separation is not possible, because social movements are often in need of political parties' better-established networks to achieve their goals. As Chiu *et al.* (1999: 60) put it: 'For environmental groups, a confrontational approach would largely rule out possibilities of cooperation with members of the power elite, such as the government and business, while a consensual approach is largely premised on support from the elite.'

The picture this article has painted so far is somewhat incomplete, perhaps giving the impression that there are no radical actions such as street protests or hardline campaigns and sit-ins in Hong Kong. Nothing could be further from the truth: the city's history includes numerous successful demonstrations on a plethora of issues, from the fear of losing political freedoms under China, to plans for mandating a more patriotic 'national education' curriculum to foster pupils' love for

¹¹ The Air Pollution Index is a simple and generalized way to describe air quality in Mainland China, Hong Kong and Malaysia. The API is calculated from several sets of air pollution data.

¹² Roadside readings on 1 and 2 August showed a concentration of toxic chemicals and particles at or above 190 for more than 24 hours, with an all-time peak of 212 recorded at the monitoring station in Central. According to Hong Kong's own standards, an API of between 51 and 100 is already considered 'High' and able to cause chronic health problems upon persistent exposure. At 101 to 200 the level is 'Very High', and above 200 'Severe'. For details see Cheung (2012) and *South China Morning Post* (2012), which were published together.

the motherland (namely China); this latter issue sparked mass protests and marches throughout the summer of 2012 that ended with a partial success for social movements and opponents of the measure (Liu 2012).

Several factors help to explain the absence of consistent protest against nuclear energy in Hong Kong: first, increased use of nuclear energy could help solve Hong Kong's abysmal air pollution problem while decreasing energy consumption derived from coal; second, more urgent environmental problems affecting daily life have come to the fore and priorities have shifted; third, social organizations are currently focusing on informing the public about nuclear energy rather than on expressing outright opposition; and fourth, because the nuclear power plant that serves Hong Kong is not located in the SAR, it is difficult for Hong Kong people to protest against it, let alone influence Chinese nuclear policies.

Public Perception of Risk towards Nuclear Energy (Before and After Fukushima)

Perception towards nuclear energy in Hong Kong is quite varied: among the business community, a survey by the China Climate Change Business Forum put forward three choices: (1) continuing with the current coal-dependent fuel mix; (2) opting for a mix of gas and nuclear power, which would reduce pollution and carbon emissions and provoke a moderate tariff increase; and (3), relying heavily on nuclear power, further reducing pollution and emissions but at a higher cost in terms of energy tariffs. Almost two thirds of respondents (62 percent) opted for the third and most expensive option, thus indicating that among businesses the idea of reaching a low-carbon economy is preferable even if it entails higher costs (*Hong Kong Business Survey on Energy Efficiency and Climate Change*, as quoted in T. Ho 2013).

In contrast, a survey by the Kadoori Institute has shown very high levels of opposition towards nuclear energy among the general population, with preferences for energy saving, energy efficiency, and renewable energy (Mah *et al.* 2011: 1, 25). Sixty-two percent of respondents opposed an increase of nuclear power in the city's energy mix and 96 percent admitted considering 'risk and safety such as health risks related to nuclear explosion' as important (Mah *et al.* 2011: 12). Surveys have to be interpreted in the light of various contextual factors. The Kadoorie survey was carried out barely two months after the Fukushima accident, reflecting the impact of a nuclear catastrophe on people's perception. The findings of two Greenpeace surveys carried out in 2010 and 2011 show that many people who were undecided on whether or not to support nuclear power previous to Fukushima have since shifted towards opposition (Greenpeace 2010, 2011). According to a global survey conducted in Hong Kong in 2008, Hongkongers are more conservative regarding nuclear energy and less supportive of it than their peers in other Asian countries such as Taiwan and China (World Public Opinion 2008).

Another survey, carried out by Civic Exchange in July 2013, has shown that even though one of the city's biggest problems is air pollution, people are far more worried about nuclear energy, with 39 percent of respondents 'very worried about health effects of nuclear radiation' and a mere 14 percent being 'very worried about health effects of coal generation' (DeGolyer 2013). A high level of ignorance

about Hong Kong's own relationship to nuclear power persists even after Fukushima, with only 47 percent of respondents correctly answering that Hong Kong does not generate any nuclear energy inside of its territory (DeGolyer 2013).

Media outlets also devote more attention to nuclear-related news in the aftermath of Fukushima, even more so when one of Guangdong's power plants is concerned. The *South China Morning Post* gave high visibility to an article titled 'Third zero-risk nuclear incident worries greens' on 15 August 2012, which investigated an accident that had occurred the previous day at the Ling Ao Plant, which lies about 50 kilometers north of Hong Kong and about a kilometer away from the Daya Bay plant (Mok 2012: C2). While the problem was a malfunctioning radiation detection system in reactor number 4, which resulted in a faulty transmission of the readings in real time to the control room, activists argue that there is no way of knowing whether human error was involved, because China refused to share any information about the incident (Interview with Koo).

Conclusions

As shown by relevant data collected through interviews and written sources, the response to the Fukushima disaster took very different forms in Taiwan and Hong Kong. This article has argued that even though in Taiwan most social organizations are quite radical and the majority of citizens have a rather high perception of what nuclear risks entail, the population is largely in favor of continuing to use nuclear, at least for the near future.

While many actors, from media outlets to state organs and civil groups, shape public perception towards nuclear energy, the most powerful parties (e.g. state and business groups) are those that have more means at their disposal, such as newspapers and other media outlets, to influence and shape public perception of risk associated with nuclear energy. In Taiwan, all important newspapers other than the *Taipei Times* and its sister publication the *Liberty Times* are controlled either by influential political elites such as the central state or rich business tycoons, who often share similar positions in support of nuclear energy. This partly explains why Taipower's emphasis on increased energy prices should nuclear power's share of the energy mix diminish has so far been more successful in influencing the public than the campaigns of social activists.

In Hong Kong, the situation is different. Here, there is high degree of mistrust and fear towards nuclear energy among the general population, while social movements and think tanks in contrast take a rather non-antagonistic and non-oppositional position (with a few exceptions): rather than simply adopting pre-conceived ideas that are either 'pro' or 'con', they instead seek to educate the public by seeking more understanding themselves. This attitude has its roots in the administrative and political system of Hong Kong, where elections, contrary to what happens in Taiwan, cannot overturn government nor change policies; instead, all activists can do is simply to try to influence public opinion. Furthermore, in Hong Kong and in environmental circles around the world, the nuclear power option is being re-evaluated for its positive role in abating carbon dioxide emissions.

Finally, a key difference between Taiwan and Hong Kong is that in Taiwan a strong attitude of 'Not In My Backyard' (NIMBY) – which developed during the

1980s and early 1990s – has linked local grievances with the campaigns of environmentalists. In Hong Kong there cannot be any NIMBY attitude because nuclear plants are not located inside the city's territory. In addition, Hong Kong's environmental movement is weaker than that of Taiwan for several reasons, including the fact that few Hong Kong residents seek to protect the environment as an expression of regionalism or localism.

Based on what we know about the Chernobyl disaster, we can expect the Fukushima catastrophe to increase public anxiety for a short period (as I have shown, this was the case in Taiwan and Hong Kong), though not that this will necessarily increase support for Taiwan's and Hong Kong's antinuclear movements at the expense of rapid economic growth. Certainly, though, both in Taiwan and Hong Kong as well as in other countries, the importance of public opinion in determining and influencing the outcome of public debates and policy changes has to be recognized fully.

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Interviews

Chang, Peter 張武修

Professor at Taipei Medical University and Chairman of the National Association for Radiation Protection

Informal conversation 31 August 2011

Chau, Melonie 周月翔

Senior Environmental Affairs Officer, Friends of the Earth (HK)

Formal interview 15 August 2012

Chen, Man-Li 陳曼麗

Chairwoman of the Homemakers' Union and Foundation

Formal interview 20 July 2011

Jobin, Paul

Former Director of the French Center for Research on Contemporary China in Taipei

Personal communication by email 24 October 2011

Kilburn, Mike

Head of Environmental Strategy at Civic Exchange

Formal interview 31 July 2012

Koo, Prentice

Senior Campaigner in charge of nuclear and energy issues at Greenpeace HK

Formal interview 30 July 2012

Lai, Fenlan 賴芬蘭

Former Secretary General, Green Party of Taiwan

Formal interviews 30 October 2011 and 24 November 2011

Lee, Frederick Yok-Shiu

Professor in the Department of Geography, University of Hong Kong

Formal interview 2012

Ng, Cho Nam 吳祖南

Associate Professor in the Department of Geography, University of Hong Kong

Formal interview 14 August 2012

Pan, Han-Sheng 潘翰聲

Spokesperson, Green Party of Taiwan

Formal interview 1 September 2011

Tan, Monica

East Asia Writer and Web Editor, Greenpeace

Personal communication by email, 7 and 13 June 2012.

Tsui, Shu-hsin 催憐欣

Secretary General of the Green Citizens' Action Alliance and a member of the NP4 Safety Committee.

Formal interviews on 24 March 2011, 8 September 2011, 20 September 2011 and informal conversation at Green Party Study Group on 22 September 2011.

Voyer, Boris

Former employee, Taiwan Ministry of Foreign Affairs.

Personal communication by telephone 16 November 2011

Xu, Gloria Kuang-Rong 徐光榮

Professor of Atmospheric Sciences at Taiwan National University

Formal interview 15 September 2011.

Zimmerman, Paul

Founder and CEO of the Non-Profit Organization Designing Hong Kong.

Formal interview 13 August 2012

References

Apple Daily (2011) '民調：昨反核團體串聯舉行反核遊行，訴求停建核四，請問你的看法？' ['Survey: Anti-nuclear groups organized a series of anti-nuclear parades, rallying for the halting of NPP-4 – Your opinion is?'], 1 May. Retrieved from <http://www.appledaily.com.tw/appledaily/article/headline/20110501/33357000>.

- Arrigo, L. G., Si, J. and Si, M. (2000) 'A Minority within a Minority: Cultural Survival on Taiwan's Orchid Island', *Cultural Survival Quarterly* 45. Special Report on Taiwan.
- Beck, U. (1986) *Risikogesellschaft: Auf dem Weg in eine andere Moderne*, Insel: Suhrkamp Verlag.
- Beck, U. (2009) *World at Risk*, Cambridge: Polity Press. Translated by Ciaran Cronin.
- Chang, P. (2012) 'Putting Nuclear Nightmares to Bed', *Taipei Times*, 17 February: 8.
- Chao, V. (2012) 'Japan Disaster: Underwater volcanoes pose risk to plant, activists say', *Taipei Times*. Retrieved from <http://www.taipeitimes.com/News/taiwan/archives/2011/03/15/2003498234>.
- Chen, D.-S. (2011) 'Taiwan's Antinuclear Movement in the Wake of the Fukushima Disaster, Viewed from an STS Perspective', *East Asian Science, Technology and Society*, 5: 567–572.
- Cheung, C.-F. (2012) 'Warn Public on Health Risks of Air Pollution', *South China Morning Post*, 3 August. Retrieved from <http://www.scmp.com/article/1008411/warn-public-health-risks-air-pollution>.
- Chiu, S. W.-K., Hung, H.-F. and Lai, O.-K. (1999) 'Environmental Movements in Hong Kong', in Y.-S.F. Lee and A.Y. So (eds) *Asia's Environmental Movements: Comparative Perspectives*, Armonk, NY and London: M.E. Sharpe, pp. 55–89.
- Chung, H. (2005) 'Nuclear Dump Dispute on Orchid Island', *ICE Case Study No. 159*. Retrieved from <http://www1.american.edu/ted/ice/orchidwaste.htm>.
- DeGolyer, M. (2013) *Shaping our Energy Policy: Guangdong and Hong Kong in the Mix*, Hong Kong: Civic Exchange.
- Doyle, J. (2011) 'Acclimatizing Nuclear? Climate Change, Nuclear Power and the Reframing of Risk in the UK News Media', *International Communication Gazette*, 73: 107–125.
- Fang, J. (2012) 'Nuclear Safety is a Contradiction', *Taipei Times*. September 8: 8.
- Fell, D. (2013) 'The Nuclear Referendum Issue in Taiwan', *The China Policy Institute Blog*, 27 March. Retrieved from <http://blogs.nottingham.ac.uk/chinapolicyinstitute/2013/03/27/the-nuclear-referendum-issue-in-taiwan/>.
- Greenpeace (2010) '中電再三淡化核電風險 七成市民矇然不知政府建議增加核電' ['CLP has Downplayed Nuclear Risks – 70% of Hong Kong People not Aware of the Government Proposal for using more Nuclear Power']. Retrieved from <http://www.greenpeace.org/hk/press/releases/climate-energy/2010/11/hk-nuclear-survey/>.
- Greenpeace (2011). '逾半市民要求擱置增加核電 綠色和平籲 4.24 挽手上街反核' ['More than half of Hong Kong People Requested Abandoning the Nuclear Expansion Plan']. Retrieved from <http://www.greenpeace.org/hk/press/releases/climate-energy/2011/04/hk-nuclear-survey/>.
- Ho, M.-S. 何明修 (2003) 'The Politics of Anti-Nuclear Protest in Taiwan: A Case of Party-Dependent Movement (1980–2000)', *Modern Asian Studies* 3: 683–708.
- Ho, M.-S. 何明修 (2005) 'Weakened State and Social Movement: The Paradox of Taiwanese Environmental Politics after Power Transfer', *Journal of Contemporary China*, 14 (43): 339–352.

- Ho, T. (2013) 'Political Will can Fuel Hong Kong's Move towards Low-Carbon Future', *South China Morning Post*, 28 February.
- Jacobs, A. (2012) 'Vote Holds Fate of Nuclear Power in Taiwan', *New York Times*, 12 January. Retrieved from <http://www.nytimes.com/2012/01/13/world/asia/nuclear-power-emerges-as-election-issue-in-taiwan.html>.
- Jobin, P. (2010) 'Hazards and Protests in the "Green Silicon Island"', *China Perspective*, 3: 47–62.
- Jobin, P. (2012). 'The Socio-Politics of Nuclear Safety in Taiwan after Fukushima Disaster', paper presented at the 1st World congress of Taiwan Studies.
- Lee, I-C. (2012a) 'Group Raises Nuclear Awareness', *Taipei Times*, 6 March. Retrieved from <http://www.taipetimes.com/News/taiwan/archives/2012/03/06/2003527123>.
- Lee, I-C. (2012b) 'Thousands March against Nuclear Power', *Taipei Times*, 12 March. Retrieved from <http://www.taipetimes.com/News/front/archives/2012/03/12/2003527569>.
- Lee, I-C. (2012c) 'Taipower Hits Back at Protesters', *Taipei Times*, 13 March.
- Lee, J. (2012) 'Experts Promote Wider Use of Energy Efficient Technology', *Focus Taiwan*. Retrieved from 21 September at http://focustaiwan.tw/ShowNews/WebNews_Detail.aspx?Type=aALL&ID=201207130021.
- Liu, J. (2012) 'Hong Kong Debates "National Education" Classes', *BBC News*, 1 September. Retrieved from <http://www.bbc.co.uk/news/world-asia-china-19407425>.
- Loa, L.-S. (2012a) 'Lanyu's Residents Grudgingly Accept Nuclear Storage', *Taipei Times*, 19 March. Retrieved from www.taipetimes.com/News/taiwan/archives/2012/03/19/2003528162.
- Loa, L.-S. (2012b) 'Tao Protest against Nuclear Waste', *Taipei Times*, 2 March. Accessed on 15 October 2012 at www.taipetimes.com/News/front/archives/2012/03/02/2003526783.
- Loa, L.-S. (2012c) 'Activists Demand Survey of Lanyu Radiation Levels', *Taipei Times*, 29 September. Retrieved from <http://www.taipetimes.com/News/taiwan/archives/2012/09/29/2003543947>.
- Loh, C. (2012a) 'Hong Kong, China and Nuclear Development: Implications from Fukushima', *Outreach Magazine*, April 30. Retrieved from <http://www.civic-exchange.org/wp/category/publications/articles/>.
- Loh, C. (2012b) *A Decision to Make – Hong Kong's Fukushima Lesson: Increase Nuclear Literacy*, Hong Kong: Civic Exchange Publications. Retrieved from http://www.civic-exchange.org/wp/wp-content/uploads/2012/03/120308NuclearReport_en.pdf.
- Loh, C. (2012c) 'The Next Chapter', *South China Morning Post*, 9 March.
- Lupke, C. (2012) 'Documenting Environmental Protest: Taiwan's Gongliao Fourth Nuclear Power Plant and the Cultural Politics of Artifice', in S.L.-C. Lin and T.-L.D. Sang (eds) *Documenting Taiwan on Film: Issues and Methods in New Documentaries*, Abingdon: Routledge, pp. 155–182.
- Lyons, D. (2009) 'The Two-Headed Dragon: Environmental Policy and Progress under Rising Democracy in Taiwan', *East Asia*, 26: 57–76.
- Ma, L. (2012) 'Churches Join Masses in Telling President Ma, "I'm a Man! I'm Anti-Nuclear!"', Website of the Presbyterian Church in Taiwan. Retrieved from http://english.pct.org.tw/enNews_tcn.aspx?strBlockID=B00177&

- strContentid=C2012061200005&strCTID=&strDesc=Y&strPub=&strASP=enNews_tcn.
- Mah, D.N.-Y., van der Vleuten, J.M., Hills, P. and Tao, J. (2011) *Consumer Perceptions of Smart Grid Development: Results of a Hong Kong Survey*. Working paper 14, The Kadoorie Institute, University of Hong Kong.
- Mok, D. (2012) 'Third Zero-Risk Nuclear Incident Worries Greens', *South China Morning Post*, 15 August, p. C2.
- Pan, H.-S. 潘翰聲. (2012) 'Cracks in Nuclear Policy Beg Questions', *Taipei Times*, 27 June, p. 8.
- Power Technology (n.d.) 'Lungmen (Dragon Gate) Nuclear Project, Taiwan'. Retrieved from <http://www.power-technology.com/projects/lungmen>.
- Schneider, C. and Banks, J. (2010) *The Toll from Coal: An Updated Assessment of Death and Disease from America's Dirtiest Energy Source*, Boston, MA: Clean Air Task Force.
- Shih, F.-L. (2012) 'Generating Power in Taiwan: Nuclear, Political and Religious Power', *Culture and Religion: An Interdisciplinary Journal*, 13 (3): 259–313.
- South China Morning Post* (2012) 'You must be choking!', 3 August. Retrieved from <http://www.scmp.com/article/1008441/you-must-be-choking>.
- Tang, S.-Y. and Tang, C.-P. (1997) 'Democratization and Environmental Politics in Taiwan', *Asian Survey*, 3: 281–294.
- Tsai, J. (2011) 'Safety of Taiwan's 4th Nuclear Power Plant called into Question', *Taiwan Today*, 20 December. Retrieved from <http://www.taiwantoday.tw/ct.asp?xItem=182684&ctNode=445>.
- Tsai, J. (2012) 'Nuclear Concerns Dominate Taiwan Environmental Poll', *Taiwan Today*, 2 January. Retrieved from <http://www.taiwantoday.tw/ct.asp?xItem=183568&ctNode=445>.
- Tsai, Y.-W. 蔡英文 (2011) '2025 *Feihe Jiayuan Jihua* 2025: 非核家園計畫' ['2025 plans for a nuclear-free home']. Retrieved from <http://www.iing.tw/p/2025.html>.
- Women de Dao* 我們的島 (2003) '*Feihe Jiayuan* 非核家園' [*Nuclear Free Homeland*], Number 216, 4 August.
- Women de Dao* 我們的島 (2011a) '*He si - Ni hao ma? 核四你好嗎?*' [*NPP-4 – How are you?*], Number 625, 26 September.
- Women de Dao* 我們的島 (2011b) '*Taiwan Da Zhen Zhiqian – Hedian Weiji* 臺灣大震之前－核電危機' [*Taiwan's Situation Previous to the Big Earthquake – Nuclear Crisis*], Number 599, 21 March.
- Women de Dao* 我們的島 (2012a) '*Shuan Bu Zhu De Zhenxiang* 拴不住的真相' [*The Truth That Cannot be Bottled Up any Longer*], Number 659, 22 June. Retrieved from <http://web.pts.org.tw/php/html/island/list.php?pbeno=1836>.
- Women de Dao* 我們的島 (2012b) '*Fushe Shipin Chi Duoshao* 輻射食品吃多少?' ['How Much Radioactive Food Can We Eat?'] Number 671, 3 September.
- World Public Opinion (2008) 'World Publics Strongly Favor Requiring More Wind and Solar Energy, More Efficiency, Even If It Increases Costs'. Retrieved from http://www.worldpublicopinion.org/pipa/pdf/nov08/WPO_Energy_Nov08_longart.pdf

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