1. INTRODUCTION

Nuclear power has long been one of the most controversial political issues. For more than half a decade, nuclear power has come under fire from those who view it as a threat to the safety and security of people, society and the environment. While nuclear advocates – such as pro-nuclear politicians and nuclear industry representatives – try to educate citizens about the benefits of nuclear power, not everyone is convinced by this polemic. The ongoing controversy surrounding nuclear power was most recently highlighted by the rhetoric depicting a ‘nuclear renaissance’ that gained momentum throughout the 2000s. Nuclear advocates argued that the stagnation and decline afflicting many of the world’s longest-standing nuclear industries would be cast off and replaced by a rapid upsurge in nuclear new build. This expectation came to be shared by political leaders across the globe, many of whom displayed a previously unforeseen level of ‘gung-ho’ enthusiasm for nuclear power.

The newfound enthusiasm for nuclear energy emerged from a belief that the logic underpinning why nuclear power plants should be built had fundamentally changed. In particular, nuclear advocates presented two key arguments for why a resurgence of nuclear power was necessary for meeting the challenges of contemporary society. Firstly, the growing importance of climate change as a policy problem meant that governments were in need of an affordable energy solution that could help to reduce carbon emissions. The nuclear industry capitalised on this by actively reframing nuclear power as a ‘green’ energy technology. Public information campaigns and lobbying efforts were undertaken to advertise nuclear power as one of the lowest greenhouse gas emitters of any method of electricity generation. Secondly, increasing geopolitical instability in Russia and the Middle East raised concerns about an over-reliance on fossil fuel imports, prompting policymakers to seek alternative energy solutions that would improve their energy security. Nuclear power appeared to pose an ideal solution for countries seeking to improve their energy independence. The combination of these two compelling arguments – environment and energy security – were meant to be ‘game changers’ in the nuclear debate that would convince sceptics of the need for nuclear energy.

However, an examination of global nuclear development since 2000 reveals little evidence of a nuclear renaissance taking place, particularly in Western Europe and North America. Political enthusiasm for nuclear power in these regions has waned, and the deep divide in public opinion over nuclear power remains. The apparent failure of the nuclear renaissance has commonly been attributed to the Fukushima nuclear disaster, which reignited public concerns over nuclear safety, raising the political transaction
costs that are required to convince voters that a nuclear renaissance is beneficial for society. However, solely attributing the failure of the nuclear renaissance to Fukushima obscures the fact that there was little evidence of a nuclear renaissance taking place prior to March 2011. Opinion polling demonstrates that the long-standing divide in public opinion over nuclear power remained firmly entrenched even when the rhetoric of a nuclear renaissance began to gain momentum. Even the ‘game changer’ arguments presented by the nuclear industry were not compelling enough to convince large segments of the public of the benefits and need for nuclear power.

This paper uses Cultural Theory as a heuristic to examine why the debate over nuclear power remains entrenched. Why does public opinion continue to remain divided over the use of nuclear power? Why has the controversy surrounding nuclear power not been resolved? In order to answer these questions, this paper uses the four “cultural types” identified by Cultural Theory as a lens through which to examine the major arguments that have dominated the nuclear debate over time. In doing so, this paper builds upon a growing recognition of the contribution that social science research can make to understanding public acceptance of energy choices.

Three conclusions are drawn from this analysis. Firstly, there is a ‘ground-hog’ element to the nuclear debate. The arguments that dominated the nuclear debate during the renaissance period have changed little from the arguments that have historically been drawn upon to support or oppose nuclear power. Rather than being a turning point in the troubled fortunes of nuclear power, the debate that occurred during the renaissance period played out much the way it always has, polarising public opinion. Secondly, little progress has been made in the nuclear debate because of the degree to which advocates and opponents of nuclear power are embedded in their own particular cultural worldview. In particular, the arguments which are typically used to promote nuclear power have been highly reflective of the beliefs and values underpinning a hierarchicalist rationality. This leads to the third and final conclusion, which is that little progress has been made in the nuclear debate because of the hierarchicalist nature of pro-nuclear arguments. Arguments that are grounded in a hierarchicalist world-view will be ineffective in convincing alternative cultural types – egalitarians, individualists, and fatalists – of the benefits of nuclear power. Consequently, the nuclear debate remains entrenched.

2. CULTURAL THEORY

Cultural Theory was developed in order to better understand the way in which individuals form perceptions of risks. The theory was first developed by Mary Douglas (1992, 1999, 1982, 1970), and then advanced by key authors such as Aaron Wildavsky and Michael Thompson (Douglas and Wildavsky, 1982, Thompson et al., 1990, Thompson, 1997, Wildavsky and Dake, 1990, Wildavsky, 1987). The theory is based upon two core ideas. First, Cultural Theorists argue that “culture matters” – that every aspect of human thought and action is influenced by culture (Mamadouh, 1999: 396). Second,
Cultural Theorists argue that there are a limited number of “cultural types” within which each individual can be categorised (Mamadouh, 1999: 396). Cultural Theorists have constructed a “grid-group” typology which provides an overview of four possible cultural types. This typology is based on two coordinates – ‘grid’ and ‘group’. The group coordinate refers to who it is that an individual interacts with. That is, the degree to which an individual is incorporated into or connected within a social grouping. The grid coordinate refers to how an individual interacts within a group. That is, the extent to which an individual’s actions and relationships are restricted and regulated within that particular social context.

The grid-group typology allows for four possible combinations of these coordinates in order to identify four possible cultural types. The first cultural type, ‘hierarchicalists’ (high grid/high group) place their faith in government and authority structures, which they see as necessary for maintaining social order and preventing the outbreak of chaos. Expert decision-making is trusted and recommendations put forward by authority figures should be followed (Oltedal et al., 2004: 20). Hierarchicalists are sceptical of any kind of self-organising or community-driven process (Hood, 1998: 73). They view structures and rules as the obvious solution to managing any kind of societal problem (van Rensburg, 2013: 35).

In contrast to hierarchicalists, egalitarians (low grid/high group) distrust bureaucrats and any kind of ‘expert’ decision-makers. They tend to perceive bureaucrats and industry officials as inherently greedy and corrupt, misusing their positions of power to advance their own interests rather than the interests of others (Oltedal et al., 2004: 20). They are suspicious of large organisations and institutions, and will be unwilling to accept risks that are imposed on them by government or expert authorities (Rippl, 2002: 150). Instead, egalitarians have a strong sense of social solidarity, and prefer authority to be placed in the hands of the common people rather than “externally defined experts” (Ripberger et al., 2012: 715). Consequently, egalitarians favour more participatory, democratic and community-driven decision-making processes. Individualists (low grid/low group) prioritise the preservation of individual freedom above all else, and therefore want to minimise government interference in the market and society (Grendstad, 1995: 225). They tend to perceive any kind of hierarchical intervention as limiting individual creativity, enterprise and progress (van Rensburg, 2013: 36). Individualists are most concerned about risks that pose a threat to their individual freedoms. Fatalists (high grid/low group) believe that they have only limited agency and control over their own life and the outcomes that they will face (Ripberger et al., 2012: 715, Michaud et al., 2009: 29). They believe that crises are inevitable, unpredictable and uncontrollable (Hood, 1998: 146). Consequently, fatalists are sceptical of any policy solution that promises to prevent future crises from occurring. Fatalists believe that there is no point trying to implement solutions to better society as such initiatives will only be counterproductive, and can serve to exacerbate the problems that will inevitably emerge. Policy failures will happen, and there is nothing that the government can, or should, do about it.
Each individual in society fits into one of the four distinctive and mutually exclusive categories of cultural type. A person cannot be both a hierarchicalist and an egalitarian, for example. Each individual associates with one particular rationality in all aspects of their life. Moreover, the four categories of cultural types are constantly “at war with each other” (Douglas, 1999: 411). They each operate within a fundamentally different “cultural bias” or worldview – a particular set of values, attitudes and beliefs about society and how the world works. The differences and contradictions between these four separate worldviews makes it difficult for each cultural type to engage in constructive dialogue with another, or to understand the different perspectives held by the other cultural types. As Boholm (1996: 73) explains, “since people will live in ‘worlds apart’ in their own society, they cannot be expected to be able to communicate or understand each other”. Furthermore, these cultural biases heavily influence the way in which individuals perceive and prioritise risks. Cultural theorists argue that the position of each individual on the grid and group axes will determine “who fears what and why” (Wildavsky and Dake, 1990). Recent applications of cultural theory have been used to better understand why new technologies are embraced by some and feared by others (Dake, 1991), or why some people care more than others about risks to the environment, such as climate change, than others (van Rensburg, 2013).

Cultural Theory emphasises the socially constructed nature of risks. In doing so, Cultural Theory challenges ‘technical’ approaches to risk which rely upon calculations of the magnitude and probability of exposure to an event or phenomenon. Instead, Cultural Theory argues that perceptions of risk are informed by the social context within which an individual is located. As a result, different people will respond to the same risk in different ways. The implication of this is that the idea of ‘risk’ cannot be solely equated with the idea of ‘safety’. Instead, the socially constructed nature of risk means that individuals vary in the way that they conceptualise, prioritise and respond to different threats or dangers. Cultural Theory is therefore an appropriate lens through which the long-standing nuclear power debate can be studied, as it “provides an explanation of the consistency and persistence of diverse reactions to controversial societal issues” (van Rensburg, 2013: 36).

The application of Cultural Theory has been subject to certain criticisms. Cultural Theory has been criticised on the grounds that the concepts of ‘grid’ and ‘group’ are not clearly defined, and that a sufficient theoretical justification has not been provided for why only two variables are considered (Oldroyd, 1986: 157-8). Cultural Theory has also been criticised for its limited explanatory power and lack of empirical applications and validity (Boholm, 1996: 66, Tansey and O’Riordan, 1999: 84). However, Mamadouh (1999: 405) challenges this critique by highlighting the growing body of empirical research that has tested the validity and assumptions of cultural theory, and demonstrated the existence of the four different ‘cultural types’. Extensive survey research has confirmed the existence of the hierarchical, individual, and egalitarian cultural biases upon which the core arguments of cultural theory are based (Wildavsky and Dake, 1990, Dake, 1991, Dake, 1992: 30, Grendstad, 1995, Ripberger et al., 2012). This can involve asking research participants to assess how much they agree with certain
statements that are used as predicates for each cultural type. For example, Grendstad (1995) investigated seventeen different variables potentially associated with the grid and group dimensions in order to detect the proportion of hierarchicalist, egalitarian, individualist and fatalist worldviews amongst Norwegian voters between 1982 and 1990. Swedlow (2011: 706) also counters the critique that cultural theory lacks explanatory power by highlighting the wide range of disciplines and fields of study within which cultural theory has been applied – including literature, popular culture, sexuality, identity, civil society, nationality, science, and many more. Cultural Theory has been used as an interpretative framework to better understand issues as diverse as the global financial crisis (Hindmoor, 2010), water management in India and Germany (Gyawali, 1999, Verweij, 1999), risk perception (Brenot et al., 1998), and climate change and environmental policy (Thompson, 2003).

3. THE NUCLEAR RENAISSANCE

The development of civil nuclear power began with an initial period of expansion, marked by the construction of the first civil nuclear power plant in the early 1950s and lasting for almost two decades. From the mid-1970s, however, the emergence of problems such as rising construction costs, increasing public opposition, and the growth of the anti-nuclear movement caused many of the leading nuclear industries to enter an enduring period of stagnation and decline. Consequently, when the rhetoric of a ‘nuclear renaissance’ began to emerge and gain momentum from 2000 onwards, it appeared that a fundamental turning point in the history of nuclear power was taking place. Journalists, government officials, and nuclear industry representatives began predicting an imminent revival of the global nuclear industry. They suggested that nuclear energy was on the precipice of a new era of development, characterised by widespread construction of new nuclear reactors and a concomitant increase in global nuclear capacity. The expectation of a nuclear renaissance was driven by its potential to address two of the most pressing policy problems faced by governments across the globe – the need to ensure a secure supply of energy in the face of rising demand and growing geopolitical tensions, and the need for governments to reduce their country’s greenhouse gas emissions in the face of global warming. These two arguments were meant to be ‘game changers’ in the nuclear debate, whereby the importance of these political issues was so immense that they would generate widespread acceptance amongst the public of the need for nuclear power and overcome the technology’s long-standing controversy.

At first, it appeared that the advocates of a nuclear renaissance were correct in their predictions. Throughout the regions of Western Europe and North America in particular, numerous political leaders, industry representatives, and even some notable environmental activists, made public statements in support of increased nuclear energy development. UK Prime Minister Gordon Brown stated he was “convinced that we need a renaissance of nuclear power” (World Nuclear News, 2008: 1). US President George W. Bush described nuclear energy as “one of the safest, cleanest sources of power in the world and we need more of it in America” (Gawenda, 2005). The chief executive of France’s AREVA Nuclear
Plants, asserted that “we are convinced about the nuclear renaissance” (Pagnamenta, 2009: 1). The Director General of the World Nuclear Association declared that a “nuclear renaissance is now gearing up everywhere in the world” (Tagliabue, 2007: 1). Prominent environmentalist James Lovelock described nuclear power as the “only green solution” to global warming, and criticised opposition to nuclear power as being based on “irrational fear” (Lovelock, 2004). Ambitious growth targets and expansion plans were set for countries with existing civil nuclear power programmes in Asia, Europe and North America. In Western Europe, several countries which had policies in place to phase-out existing nuclear power plants, or which opposed the development of nuclear power in the country altogether, showed signs of re-evaluating their policy positions. Figures from the World Nuclear Association (2013a) indicated that over forty-five countries that did not use nuclear energy were seriously considering establishing a nuclear industry.

While members of the nuclear industry continue to assert the inevitability of a nuclear renaissance, political enthusiasm for nuclear energy has waned in recent years. Several countries which had initially showed signs of reversing their anti-nuclear policy positions have chosen not to do so. Germany, Switzerland, and Italy have reconfirmed their decisions to ban construction of any new nuclear power plants (Breidthardt, 2011, Stuart, 2011, WNA 2013c). Belgium has abandoned plans to expand its nuclear industry (WNA 2013b). Political leaders have become less willing to publically endorse nuclear power. This is evident in the US State of the Union (SOTU) addresses, wherein the incumbent President provides a keynote speech outlining the government’s political and legislative agenda for the upcoming year. The SOTU addresses made by President George W. Bush in 2005, 2006, 2007, and 2008, as well as the SOTU addresses made by President Barack Obama in 2010 and 2011 all contained positive statements about the continued use of nuclear energy for civil purposes (Bush, 2005, Bush, 2006, Bush, 2007, Bush, 2008, Obama, 2010, Obama, 2011). However, civil nuclear energy has received no mention whatsoever in the SOTU address from 2012 onwards.

Over time, it has become increasingly clear that the reality of nuclear development since 2000 was not reflecting the rhetoric of a nuclear renaissance. While there has been some limited increase in the amount of electricity generated by nuclear power since 2000, this increase has mainly been caused by technical alterations, productivity improvements and lifetime extensions at existing nuclear power plants, rather than as a result of new reactors entering operation (Schneider et al., 2012: 10, 13, Heffron, 2013: 255). The total number of nuclear reactors that have been connected to the grid worldwide from the mid-1980s onwards has been only slightly larger than the number of reactors being retired (Walls, 2011: 13). Moreover, the growth in nuclear power generating capacity has been far less than the growth experienced by other energy sources. Nuclear energy as a share of global electricity production has been steadily decreasing from its peak of 17.6 percent in 1996 through to 10.8 percent in 2014 (Schneider et al., 2015: 23).
Journalists and energy analysts alike have reported on the failure of the nuclear renaissance. Headlines describe the nuclear renaissance as a “myth” (Financial Chronicle, 2010: 1) and as having “failed to materialize” (Wald, 2010: 1). An article in The Economist (2012: 1) branded nuclear energy as “the dream that failed”, concluding that “the promise of a global [nuclear] transformation is gone”. Several high-profile international energy reports concluded that the nuclear renaissance has failed. The World Nuclear Industry Status Report 2013 described the nuclear renaissance as “all in ruins now” (Schneider et al., 2013: 4). A presentation by the International Energy Agency on the World Energy Outlook 2014 stated that there is “no nuclear renaissance in sight” (IEA 2014: 11). The World Energy Resources 2013 Survey reported that “globally, the nuclear industry is in decline” (World Energy Council, 2013: 4.6).

Clearly, there is little evidence to suggest that the expectation of a nuclear renaissance has become a reality. This is particularly surprising given that the foremost argument for a nuclear renaissance – that nuclear power was the ideal solution to meet the growing need for low-carbon energy solutions that would reduce dependence on foreign fuel imports - appeared to be a game changer in the nuclear debate. These were major policy problems facing almost all the countries of the world. The nuclear industry effectively positioned themselves as being ready to provide the most cost-effective, secure, and environmentally-friendly energy solution. Moreover, the level of political rhetoric in support of nuclear power was far beyond anything that had been seen for the past thirty years, particularly in the regions of North America and Western Europe, where political leaders at the highest level of government publically declared the need for nuclear power for reasons of environmental and energy security. This again indicated that the arguments for nuclear power were indeed convincing. Even environmentalists – some of the most vocal and long-standing opponents of nuclear power – appeared to be changing their minds and ‘seeing the light’ on nuclear power.

Furthermore, the arguments for a nuclear renaissance have done little to heal the long-standing divide in public opinion over the use of nuclear energy. Opinion polls demonstrate that, even as the rhetoric of a nuclear renaissance gained momentum, public opinion on nuclear power throughout Western Europe and North America continued to be deeply divided. This divide was present even before the 2011 Fukushima nuclear disaster. In the US, a Gallup poll found that in 1994, 57 percent of respondents favoured the use of nuclear energy as one of the ways to provide electricity while 37 percent opposed it (Bowman et al., 2015: 124). Gallup recorded a similar divide in March 2015, with 51 percent favouring nuclear energy and 43 percent opposing (Bowman et al., 2015: 124). A 2008 Eurobarometer poll found that an almost identical number of respondents supported nuclear energy (44 percent) as opposed it (45 percent) (European Commission, 2008: 5). A study on public perceptions of nuclear power in Britain conducted in 2011 found that 23 percent of respondents believed that the number of nuclear power stations in Britain should be increased, 21 percent believed that the existing number of nuclear power stations should be maintained, 21 percent believed that nuclear power should be phased out, and 11 percent believed that Britain’s existing nuclear power stations should be immediately shut
down (Poortinga et al., 2013: 1209). Clearly, nuclear power has continued to be a highly divisive issue throughout the period when a nuclear renaissance was expected to take place. These studies demonstrate that, even prior to the Fukushima nuclear disaster, public support for nuclear power has not become more widespread in the way that the rhetoric of a nuclear renaissance suggested. Throughout Western Europe and North America, the use of nuclear power continues to be a controversial and polarising political issue. The following section uses Cultural Theory as an interpretive framework to better understand why the nuclear debate remains so entrenched, and why the arguments for a nuclear renaissance have failed to convince sceptics of the need for nuclear power.

4. APPLYING CULTURAL THEORY TO THE NUCLEAR DEBATE

In recent years there has been a growing recognition of the valuable contribution that social science theories and methodologies can make to energy research and policy (see Sovacool, 2014, Stern, 2014, Sovacool et al., 2015, Rochlin, 2014, Ryan et al., 2014, Spreng, 2014). This paper builds upon this recognition by arguing that one particular social science theory, Cultural Theory, offers useful insights into better understanding the reasons why nuclear power continues to be controversial, and why the nuclear debate remains entrenched. Despite the expectation that the nuclear renaissance represented a fundamental shift in the history of nuclear power, little has changed in the nuclear debate. This is particularly evident in the regions of Western Europe and North America, where public opinion over nuclear power continues to remain deeply divided. Clearly, much of society remains unconvinced by the arguments put forth by those advocating a nuclear renaissance. This ongoing public opposition to nuclear power means that significant political capital would need to be invested by governments if they are to convince their citizens of the benefits of nuclear power, making the prospect of a nuclear renaissance a far less politically attractive option.

This section uses each of the four cultural types identified by Cultural Theory as a lens through which to examine the historical and contemporary arguments invoked to support and oppose nuclear power. It seeks to explain why there is an entrenched division in public opinion on nuclear power. In doing so, it highlights the way in which each cultural type – hierarchicalists, egalitarians, individualists and fatalists – tends to hold a particular view on nuclear power that is inherently linked to their underlying beliefs, views and rationalities. It demonstrates that the arguments which have historically been used to advocate for nuclear power have been dominated by a hierarchicalist perspective, and that this is problematic as it alienates individuals who associate with alternative cultural types. It illustrates the way in which the particular values that characterise an egalitarian, individualist and fatalist worldview means that they will be unconvinced by a hierarchicalist-centric argument for nuclear power.
4.1 HIERARCHICALISTS

Hierarchicalist individuals tend to hold a specific view on the use of nuclear power that is influenced by their underlying values and beliefs. The inherent trust that hierarchicalists hold for government and authority figures means that they are willing to accept the use of nuclear power, provided that it is endorsed by government officials. Similarly, the high levels of trust that hierarchicalists place in expert decision makers makes them inclined to believe the claims made by nuclear scientists and engineers about the benefits of nuclear power. Hierarchicalists believe that government action can solve any kind of societal problem, and as such, are confident that effective regulation can ensure that nuclear power plants are operated safely and without incident. Hierarchicalists assume that any risks associated with nuclear power can be effectively managed through regulation. Nuclear accidents are dismissed as a case of insufficient regulation – a problem that can easily be fixed through the implementation of more rigorous regulatory regimes. Hierarchicalists prioritise scientific reasoning and ‘rational’ thinking, and therefore assume that public scepticism towards nuclear power is simply a result of a lack of knowledge and education about the technology. They try to educate the public on the ‘facts’ of nuclear power and dispel the ‘myths’ put forward by nuclear opponents. Advocates of nuclear power tend to draw upon four key arguments to highlight the benefits of nuclear energy. That is, that nuclear power is a secure, affordable, safe and low-carbon source of electricity production. These arguments have dominated the nuclear debate in both the historical and contemporary period. These arguments are now examined in further detail in order to illustrate that they are grounded in a hierarchicalist rationality.

The development of nuclear power has long been justified on the grounds that it provides a secure form of energy generation. In the aftermath of World War II, political and industry leaders in the UK, France and Germany advocated for the construction of a nuclear energy programme because it could guarantee their energy security (The New York Times, 1954: 5, Winnacker and Wirtz, 1979: 44, Ministry of Fuel and Power, 1955). All three countries were heavily dependent on coal as a fuel source, but were faced with rapidly dwindling domestic coal supplies which had been depleted by both wartime efforts as well as the reconstruction programme afterwards. Energy security fears were exacerbated by the 1973-74 OPEC oil crisis which highlighted the extent of each country’s dependence on fossil fuel imports. For countries with limited indigenous energy reserves, such as France and Japan, the oil crises were fundamental to the rapid development of their nuclear industries (Walls, 2011: 10).

When talk of a nuclear renaissance emerged in the early 2000s, energy security was once again one of the key arguments drawn upon by advocates of a nuclear revival. Geo-political instability in Russia – the largest natural gas supplier in Europe – prompted countries to revisit nuclear power as an alternative, more secure form of energy. Growing concerns over dependence on Russian gas supplies prompted countries such as Lithuania, the Ukraine, Turkey and Belarus to consider diversifying their energy portfolios by developing their nuclear industries (The Baltic Times, 2012, WNA 2014, Peker, 2011,
In Finland, fears of over-reliance on Russian gas imports led the government to consider plans to double the country’s nuclear capacity (Pohjanpalo and ben-Aaron, 2010). The British Government’s long-term nuclear energy strategy described nuclear power as “vital for our energy security” (Department of Energy and Climate Change, 2013: 18). US President George W. Bush stated that “for the sake of economic security and national security, the United States must aggressively move forward with construction of nuclear power plants” (Baker and Mufson, 2006).

Secondly, advocates of nuclear power argue that it is an affordable source of electricity production. When civil nuclear energy programmes were first established in the 1950s and 1960s, the production of nuclear-generated power was expected to be highly cost-competitive with alternative sources of energy. In 1957, the Chairman of the US Atomic Energy Commission promised that nuclear power would produce “electrical energy too cheap to meter” (IAEA 2004: 1). In Britain, early parliamentary discussions on nuclear investment focused heavily on the cost benefits provided by domestically-produced nuclear energy versus imported fossil fuels. The same argument – that nuclear power is a cheaper source of electricity generation than alternative fuel supplies – again formed a key basis of the pro-nuclear arguments advocating a nuclear renaissance. Advocates of nuclear power argued that the development of new reactor designs and technologies would make the construction of nuclear power plants cheaper and simpler than ever before, while also offering improved economic performance (Thomas, 2012). Representatives of the nuclear industry made public statements guaranteeing that they would be able to fully fund the construction of new nuclear build, rather than relying on the high levels of state support that had historically been necessary for the development of nuclear power anywhere in the world.

Another of the major arguments that have been used to promote nuclear power is that it is a highly safe form of electricity generation. In the 1950s and 1960s the scientific community campaigned to reassure the public that the problems associated with radioactive materials could be safely managed through technical and engineering solutions, and that nuclear power did threaten human or environmental safety (North, 1998: 123). Any potential risks posed by nuclear power posed were dismissed on the grounds that the statistical probability of a nuclear incident occurring was minimal (Scurlock, 2010: 31). When the first large-scale nuclear accidents took place at Three Mile Island in 1979 and Chernobyl in 1986, they were dismissed as anomalies. Nuclear industry officials remained adamant that differences in Soviet and Western reactor designs and safety standards meant that it was impossible for a disaster like Chernobyl to take place elsewhere (Thorson, 1986, Wilson, 1986: A21). Similarly, when the rhetoric of a nuclear renaissance emerged, advocates of the nuclear revival once again argued that nuclear power was one of the safest of all energy sources. For example, nuclear regulatory bodies argued that stronger regulatory requirements had made the risks posed by nuclear power plants “very small” (US Nuclear Regulatory Commission, 2014), or “extremely low” (Office for Nuclear Regulation, 2014: 23).
One of the more recent arguments that has been used to promote nuclear power is that it produces almost zero carbon emissions, making it one of the most environmentally-friendly sources of electricity production. Nuclear advocates have capitalised on the international community’s growing awareness that greenhouse gas emissions need to be rapidly reduced in order to address threats posed by climate change. They emphasise the low carbon emissions resulting from nuclear generated electricity, which can assist governments with meeting their emissions targets in the context of climate change. As early as 1992, nuclear industry organisations framed nuclear power plants as environmentally friendly because they “produce no greenhouse gases” (Farseta, 2008: 39). In 1998 and 1999, the Nuclear Energy Institute ran newspaper advertisements which described nuclear power as an “environmentally clean” energy source (Farseta, 2008: 39). The World Nuclear Association describes nuclear power as “the single most significant means of limiting the increase in greenhouse gas concentrations while enabling access to abundant electricity” (World Nuclear Association, 2015). Westinghouse (2015), one of the major suppliers of nuclear technology, advertises nuclear power as having “no adverse effects to water, land, habitat, wildlife, or air resources”.

Each of the four major arguments used by advocates to promote nuclear power – cost, energy security, safety, and low-carbon emissions – reflect the rationality of a hierarchicalist. They are grounded in the hierarchicalist belief that experts “know best” and that expert knowledge and scientific reasoning should be trusted. They assume that the provision of quantitative data and technical reports on the safety, cost, energy production or environmental impact of nuclear power will convince the public that nuclear development is inherently beneficial to society, and will reassure the public that any risks posed by nuclear power can be safely contained through regulation. They assume that any public scepticism over nuclear power can be mitigated through the provision of greater education on the ‘facts’ of nuclear power. This is achieved by producing information booklets and campaigns detailing the scientific evidence which ‘proves’ the benefits of nuclear power.

4.2 EGALITARIANS

The beliefs which underpin an egalitarian worldview makes this particular cultural type highly critical of the use of nuclear power. Egalitarians are inherently distrustful of bureaucrats and any kind of ‘expert’ decision-makers. This means that they are unlikely to accept the promises made by government and industry officials in regards to the benefits and safety of nuclear power. They are unconvinced by the hierarchicalist arguments that nuclear power is necessary for ensuring energy security. Instead, egalitarians argue that there are better alternative solutions to meeting the interrelated challenges of climate change and energy security. For example, an egalitarian would typically argue that the use of renewable energy technologies is a more moral, safer and environmentally-friendly solution to meeting energy demands. Moreover, egalitarians are concerned with the moral and ethical impacts of technology
and industrial development, and typically object to nuclear power over issues of societal, environmental, transnational and intergenerational injustice. For example, they are concerned about the potential for civil nuclear energy programmes to encourage the proliferation of nuclear weapons. This focus on ethical considerations means that the cost-benefit analyses and heavily quantitative technical reports produced by nuclear advocates to sway public opinion in favour of nuclear power will have little effect on an egalitarian. They argue that it is the broader impacts on society that result from the use of nuclear power that make the technology an unacceptable risk. These core features that define an egalitarian worldview is reflected in one of the major criticism made about the use of nuclear power – that it poses unacceptable risks to the safety of humans, society and the environment.

A common criticism of nuclear power is that there are unpredictable, unpreventable and uncontrollable risks inherent to its use. This is an argument that is fundamentally grounded in an egalitarian worldview, and has long been the major claim made by long-standing opponents of nuclear power, such as environmental organisations, ‘green’ political parties, and localised protest movements. Since opposition to nuclear power first began to gain momentum in the 1970s, each of these traditionally anti-nuclear stakeholders have drawn attention to the risks posed by accidents at nuclear power plants and the potential for radioactive particles to be released into the environment. Anti-nuclear grass-roots networks, organisations and action groups attempted to educate the public on the dangers of nuclear power by staging protests, producing leaflets, and publically lobbying the government end their use of nuclear power. When the rhetoric of a nuclear renaissance began to emerge in the early 2000s, critics once again drew upon the argument that nuclear power is inherently unsafe and an unacceptable danger to society, and challenged the hierarchical argument that new reactor designs made the technology safer than ever before. This again demonstrates the ‘groundhog’ element of the nuclear debate – the same arguments are consistently being drawn upon by critics of nuclear power. There is little that is new in the debate. Greenpeace International (2014) argued that “safe reactors are a myth”, while continuing to assert that nuclear power is “inherently dangerous”. Friends of the Earth (2013) argued that nuclear power should not be pursued as it is one of the “most dangerous” sources of energy production. The United States Green Party (2012) advocated for a complete phase-out of nuclear power, rather than a nuclear revival, because “all processes associated with nuclear power are dangerous”.

The argument that nuclear power should not be used as it is unsafe reflects an egalitarian rationality. Egalitarians’ concern over the risks posed by nuclear power stems partly from their inherent distrust of bureaucrats and government officials, which causes them to believe that government and industry leaders cannot be trusted to prevent a nuclear disaster from occurring. They do not accept the hierarchical argument that sufficient government regulation can ensure that nuclear power plants are operated safely. An egalitarian account of nuclear power highlights the disasters at Three Mile Island in 1979 and Chernobyl in 1986 as evidence of the dangers associated with nuclear power and the inability of government regulation to prevent nuclear accidents from occurring. Egalitarians are also
highly sensitive to any risk that could pose dangers to society or the natural environment (Jones, 2011: 720), particularly if the impacts could be irreversible or long-lasting (Rippl, 2002: 150). Consequently, the storage, transportation and disposal of nuclear waste is a major concern for egalitarians, given that radioactive waste remains toxic for thousands of years.

4.3 INDIVIDUALISTS

The individualist cultural type is the most ambivalent about the use of nuclear power. Individualists prioritise market freedom above all else, and are therefore willing to accept the use of nuclear power provided that it can compete in a free market. Individualists oppose government intervention being undertaken to support nuclear energy, and are therefore critical of the high levels of state aid that have historically been necessary for the construction of nuclear power plants. They believe that if nuclear power is to be used, it should be entirely funded by the private sector. Individualists can be either supportive of nuclear power or critical of its use, depending on whether or not they are convinced that it can compete in the free market. However, the history of cost-overruns at nuclear power plants means that individualists are distrustful of the private sector’s ability to independently fund nuclear power development. Nuclear power’s track record suggests that it is unable to compete in a free market, and as such, individualists are similar to egalitarians in that they are inherently sceptical of government promises justifying the need for a nuclear renaissance.

One of the major arguments that have been drawn upon by advocates of nuclear energy is that it is one of the most cost-competitive forms of electricity generation. This is an argument that should appeal to an individualist rationality. As discussed in Section 4.1, hierarchicalists make bold promises about the affordability of nuclear power. This is an argument that featured heavily in the rhetoric of a nuclear renaissance. However, the reality of nuclear power construction costs to date suggests that individualists will remain unconvinced of the cost argument for nuclear power. Throughout the history of civil nuclear power, nuclear construction projects have frequently exceeded their original cost estimates. One of the most high-profile examples is the Shoreham Nuclear Power Plant, which was initially estimated to cost $75 million when the project was announced in 1966, but ended up costing approximately $5.5 billion by the time the project was abandoned (Ross and Staw, 1993: 708). The Clinch River Breeder Reactor Project, estimated in 1973 to cost $700 million, was still being constructed at an eventual cost of $3.5 billion in 1982, at which point Congress decided to stop funding the project (Joppke, 1993: 62). In the UK, construction began on the Dungeness B nuclear reactor in the mid-1960s with an estimated cost of £89 million, but by 1982 the project was still under construction at an estimated cost of £530 million (Dickson, 1982: 24). An investigation by Grubler (2010) into the projected and actual costs of the French PWR nuclear power programme demonstrated that the costs of constructing new nuclear
reactors in France steadily escalated from the mid-1970s to the mid-1990s, although these costs were consistently underestimated in formal cost projections.

Another argument underpinning the expectation of a nuclear renaissance was that technological advancements and new reactor designs, such as Generation III+, would overcome the financial problems that had plagued nuclear construction projects. In 2002, the US government launched its Nuclear 2010 programme on the basis that Generation III+ reactor designs would “result in lower and more predictable construction and operating costs” (Thomas, 2012: 52). British policymakers asserted that the economic competitiveness of nuclear power meant that no state funds would be allocated for the construction of new nuclear reactors. This decision was supported by the nuclear industry who were adamant that nuclear new build could be funded entirely by the private sector. For example, E.ON UK (2008) stated in a press release that “there is no requirement for either government subsidies or for a guaranteed long-term cost of carbon to make new nuclear power stations economic”.

However, the rhetoric of a more financially competitive nuclear power industry failed to become a reality. The same financial problems that had plagued nuclear power in the past continued to persist during the nuclear renaissance, when there continued to be a deep divide between the estimated and actual costs of constructing nuclear power plants. The nuclear industry had predicted that a Generation III+ nuclear reactor could be built at an overnight cost of approximately $1000/kW, but more recent cost estimates have placed this figure at five to six times higher than its original estimate (Thomas, 2012: 52). The Generation III+ reactors that have begun construction in Finland and France are both evidence of the ongoing financial problems faced during the renaissance period. Construction approval was granted for a new reactor at the Finnish Olkiluoto Nuclear Power Plant in 2002, with an estimated construction time of four years at a cost of €3 billion (Schneider et al., 2013: 49). By 2015, however, construction was still not complete, and the revised cost estimate has almost tripled (YLE, 2014). This was the same nuclear reactor that had previously been praised by the CEO of AREVA SA for making “into reality the nuclear renaissance” (Erkheikki, 2005: 1). Similarly, the Flamanville Nuclear Power Plant in France was originally expected to be completed by 2012 at a cost of €3.3 billion (World Nuclear News, 2007), but has since been revised to completion in 2016, at an estimated cost of €8 billion (World Nuclear News, 2012).

The ongoing financial problems faced by new reactor construction projects means that individualists are likely to remain unconvinced by the hierarchicalist argument that nuclear power is a cost effective source of energy production. Individualists remain distrustful of government promises about the economic competitiveness of nuclear power. Until these financial problems are overcome, and nuclear power becomes able to compete in a free market system, individualists will remain unconvinced about the need for nuclear power.
4.4 FATALISTS

The beliefs and values which underpin a fatalist worldview means that this particular cultural type tends not to participate in the nuclear debate. Fatalists believe they have only limited control over their own life and the outcomes that they will face. They believe that crises are inevitable, unpredictable and uncontrollable, and this belief informs their view of nuclear power. Fatalists focus on the remote chance of nuclear risks become a reality, and are certain that nuclear disasters will occur. They tend not to participate in the nuclear debate as they believe that there is little that they could do to influence nuclear energy development. Consequently, fatalists tend to be the “non-actors” in policy debates as they believe that their voice will not be heard (Thompson, 2003: 5108), and this holds true for the nuclear debate as well.

Fatalists are unconvinced by the hierarchicalist argument that nuclear power is a safe form of electricity production. Their belief that disasters are inevitable means that fatalists are deeply sceptical of any government or industry promise that nuclear accidents can be prevented. Consequently, fatalists remain unconvinced by a hierarchicalist explanation of why nuclear power plants should be built. However, as fatalists believe that they have little influence over the outcome of whether nuclear power plants are built or not, they tend not to actively voice their concerns about the inevitably of nuclear disasters and the inadequacy of regulation to prevent such incidents from occurring.

5. CONCLUSION

The application of Cultural Theory as a heuristic to examine the debate over nuclear power reveals three key conclusions. Firstly, little has changed in the historical and contemporary arguments used to justify nuclear power. The nuclear renaissance was meant to be a turning point in the nuclear debate, whereby acceptance of nuclear power would become more widespread. One of the main reasons for this expectation is that one of the major arguments used to justify nuclear new build – that it provided an ideal solution to the challenges of both climate change and energy security – was meant to be a ‘game changer’ in the nuclear debate. These issues were represented as emerging policy problems which offered a new platform for nuclear development, and presented a new public image for nuclear power that was far removed from the controversy that had surrounded nuclear power especially since the Chernobyl nuclear disaster in 1986.

However, the arguments that were used to promote a nuclear renaissance were much the same as the arguments that had been used to justify nuclear power since the first civil nuclear energy programmes were constructed in the 1950s. This is particular the case for the arguments that nuclear power is a cost-competitive source of energy production, that nuclear power is a highly safe form of energy production, and that nuclear power provides an effective solution to ensuring a country’s energy security by reducing its dependence on fossil fuel imports. However, even the argument that nuclear power is
necessary to help reduce carbon emissions in the fight against climate change is not especially new, with the nuclear industry actively reframing nuclear power as an environmentally-friendly, low carbon source of electricity production since the early 1990s. In her examination of public relations campaigns conducted by the nuclear industry over time, Farseta (2008: 41) concludes that “the most striking thing about campaigns to promote nuclear energy is how little the tactics and messages have changed over the decades”.

Secondly, an application of Cultural Theory to the nuclear debate reveals that the arguments used to promote nuclear power are highly reflective of the beliefs and values underpinning a hierarchicalist worldview. Each of the four cultural types identified by Cultural Theory tend to have a particular perspective on nuclear power that is influenced by their underlying beliefs, values and rationalities. Hierarchicalists tend to be the greatest supporters of nuclear power. The major arguments that have been used to advocate for nuclear power – cost, safety, energy security, and low carbon emissions – each reflect a hierarchicalist rationality. This is evident in the way that each of these arguments are constructed by drawing upon expert knowledge, technical reports and quantitative data as evidence of the benefits of nuclear power and its superiority over other forms of energy generation.

However, a third and final conclusion that can be drawn from an application of Cultural Theory to the nuclear debate is that the domination of a hierarchicalist rationality in the arguments used to justify nuclear power makes them ineffective in convincing other cultural types of the need for nuclear power. Cultural Theory illustrates the way in which each of the four cultural types present in society are in constant conflict with one another. An argument that is grounded in the rationality of one particular cultural type is unlikely to convince those of the remaining three cultural types. In the case of the debate over nuclear power, this means that while the arguments used by nuclear advocates continue to remain grounded in a hierarchicalist rationality, they are unlikely to succeed in convincing members of the public who associate with an egalitarian, individualist, or fatalist worldview that nuclear power is indeed beneficial for society. Consequently, the debate over nuclear power continues to remain entrenched. Little progress will be made in moving the nuclear debate forward until advocates of nuclear power begin to seriously engage with a broader range of cultural rationalities. This means moving beyond a reliance on scientific data and cost-benefit analyses in order to better educate the public on the benefits of nuclear power.

Clearly, the rhetoric of a nuclear renaissance has failed to generate a more widespread acceptance of nuclear power. Nuclear power continues to be a highly controversial political issue, dividing public opinion. Cultural Theory provides a useful framework to understand why this is the case. For as long as public opinion on nuclear power remains divided, government leaders, wary of a voter backlash, are unlikely to expend their limited political capital in an attempt to heal this divide and convince voters of the benefits of nuclear power. Recycled attempts by the nuclear industry to better educate the public on
the benefits of nuclear power are unlikely to succeed. A new approach to the nuclear debate is needed that better recognises the presence of multiple and conflicting cultural types in society. Until then, the debate over nuclear power will continue to remain entrenched.
References


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