Managing the Future Energy Policy for Ireland: Examining the Role of Nuclear Power

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Abstract

This study assesses the attitudes and opinions of Irish people towards the use of nuclear power, and specifically examines the concept that Ireland should use nuclear power to generate electricity in the future. Currently, Ireland has a prohibition on nuclear power, with little debate or discussion on same, and with scant amounts of information published on the subject as it relates to Ireland. Conversely, from an international perspective, there is a significant volume of literature available covering all aspects of nuclear power, generated from over 50 years of nuclear power operations. Nuclear power technology is perceived as being a relatively cheap source of electricity, with some positive environmental credentials. The evidence from this study, however, highlights that the public's attitudes are predominantly influenced by safety concerns and issues surrounding nuclear waste management. This research study has found that Irish people do not support nuclear power at present, but may consider supporting nuclear power under certain circumstances and conditions in the future. This current investigation reveals that if nuclear power could be proven to provide lower electricity costs, lower carbon dioxide emissions and enhanced security of supply, attitudes and opinions could change towards nuclear power to the point that it could become favoured. This research has identified key findings that point to a desire that relevant information on nuclear power be made available in Ireland, and also for the instigation of a national debate on the use of this technology for electricity generation in the future.

KEYWORDS: Nuclear Power, Climate Change, Future Energy, Government Policy and Prohibition on Nuclear Power.

INTRODUCTION

Energy Challenge

This research is an assessment of public attitudes and opinions towards the use of nuclear power in Ireland for the production of electricity and explores circumstances under which nuclear power may be utilised in the future. The Energy Information Administration (2009) reports that world marketed energy consumption is projected to increase by 44 percent from 2006 to 2030. Gittus (2007) commented that forecasts reveal that in the 21st century, the world's reserves of coal, oil and gas will be virtually exhausted, and illustrates that Irish electricity generation by fuel type will underpin the reliance on fossil fuels. Campbell (2000) states that the discovery rate for crude oil has dropped to such a significant level that for every one barrel of conventional oil found, four barrels are consumed. Gallis (2009) states that most European countries are heavily reliant upon imported energy, with European Union (EU) countries as a whole importing 50% of their energy needs, a figure expected to rise to 70% by 2030. Doran (2009) further argues that if the EU is to secure a viable energy future, member states must develop a robust policy response based on the framework of collective energy security.

According to Sustainable Energy Ireland (2007), since the mid-1990s, Ireland's energy import dependency has grown considerably, from a figure of 69% in 1990, to a significant 90% in 2006. King (2009) argues that as Ireland relies on coal, oil, gas or peat for about 90% of its electricity, and only produces a tiny fraction of what is consumed. Ireland is now more heavily dependent on imported oil for energy requirements than almost every other European country.

Nuclear Power Option

According to McWilliams (2006), the world and Ireland is at a once-in-a-century crossroads in terms of energy, with a movement away from carbon based fuels to nuclear power. Keenan (2008) reported that Ireland, by building just one nuclear power station, could reduce carbon emissions from the electricity industry by a fifth.

McWilliams (2006) states that Ireland simply has no alternative as oil is running out and as the regimes that control oil become increasingly unstable, oil supplies might be unsound even before it runs out. According to Gittus (2007), Ireland needs alternatives energy sources if the country is to avoid shortages and 'Energy Wars', but these alternatives must be secure, environmentally acceptable and affordable.

Quinn (2009) further argues that the money spent on four years' worth of carbon emissions credits, (which is just under €1 billion), would cover the cost for Ireland to build a medium-sized nuclear power station. According to King (2009), antipathy to nuclear power in Ireland has become a kind of secular religion, based almost entirely on superstition and bad science. McWilliams (2005) states that people in Ireland are afraid of the N (nuclear) word, so much so, that it cannot be used in polite conversation, being a word so vile, foul and degrading, it automatically puts you 'outside the pale'.

In this research, three general circumstances have been reviewed and discussed: first, the commerciality of nuclear power and its potential impact on electricity prices in Ireland, second, nuclear powers environmental credentials and its potential contribution to lowering CO2 emissions, and third the enhanced security of supply that nuclear power may bring. These three criteria or set of circumstances are the main focus of this research, which explores whether one, or a combination of the three, could lead to Ireland removing the prohibition on nuclear power, and building its first nuclear powered electricity generating station.

RESEARCH METHODOLOGY

This research is based on the hypothesis that if the Irish public were provided with more information on the potential benefits of nuclear power, and such information was founded on governmental, international and institutional evidence supporting the commercial competitiveness, environmental friendliness, and enhanced security of supply of nuclear power, a significant increase in public support for the use of nuclear power in Ireland could be achieved. The theory underpinning this research study is that public attitudes and opinions in Ireland towards nuclear power are directly proportional to the amount of information available on the subject, and the amount of public debate on such information. This research is intended to achieve a number of objectives:

- To examine attitudes and opinions towards the current usage of energy in Ireland for electricity production.
- To understand attitudes and perceptions towards lowering Irelands CO2 emissions.
- To investigate if the use of nuclear power in Ireland would be considered acceptable based on the following three criteria:
    - Commercially Competitive
    - Environmentally friendly
    - Security of supply enhancement
- To examine if there was a solid platform for a nuclear power program to be debated in Ireland.

The researcher chose to use a quantitative methodology, employing a survey, to collect data to generate statistical information in pursuit of finding answers to the research question. The decision to choose this method was heavily influenced by the researcher's belief that quantitative research would generate more reliable data and information over that which qualitative research would provide in answering the research question. Cohen (2000), states that researchers often favor questionnaires as all the participants are exposed to the same questions.

This research study was undertaken to investigate amongst a cross section of Irish people general attitudes and opinions towards nuclear power, and to determine if these attitudes and opinions would change if circumstances arose where commercial, environmental and enhanced security of supply benefits could be proven to accrue from the use of nuclear power for electricity generation in Ireland. The researcher set thirty two questions for participants to answer. Questions one to fourteen focused on attitudes and opinions as they relate to the fuel mix used in Ireland to generate electricity. Questions fifteen to thirty two focused more on nuclear power.

The limitation of this research was the lack of good quality information relating to nuclear power in Ireland. A further limitation of this research was the difficulty in reaching a larger sample size. The researcher would have preferred to have worked with a larger sample size of one hundred or greater. The final sample size in this research, eighty participants, was limited by time and complexity of administrating the survey questionnaire.

LITERATURE REVIEW

Nuclear Power: An Irish Context

Ireland has no history of nuclear power electricity generation, with the use of nuclear power prohibited under legislation in Ireland. Therefore, there is no history to base a literature review of the commercial, environmental or security of supply aspects of nuclear power in Ireland. This literature review presents experiences from countries that have had a history of operating nuclear power plants. Ahern (2007) wrote that n*ever in our history has our energy policy been so important, not only due to its role in fuelling the engine of the economy, but also given its centrality in how we manage and protect our environment and respond to climate change. In this context, energy policy and environmental policy are seen as two sides of the same coin,* (2007: 3).

According to the Department of Communications Energy and Natural Resources (2007), there is a need to focus on Ireland's demand and use of fossil fuels for the production of energy, on the use of renewable energy sources, setting of targets for a reduction in the use of carbon dioxide (CO2), generating fossil fuels, promotion and support for a greater dependence and usage of renewable energy technologies and the Kyoto based targets for limiting the emissions of carbon dioxide, amongst other things.

Prohibition on Nuclear Power in Ireland

According to Ryan (2007), the Irish government believes that nuclear power is neither sustainable nor the answer to Ireland's energy needs. According to McManus (2007), there is no percentage for Ireland to get involved in the debate on nuclear power, politically and legally it is a 'non-runner'. Irish people have enough to be doing without wasting their time on having a debate on nuclear power, (McManus, 2007). The Irish government fully intends to maintain the statutory prohibition on nuclear generation in Ireland and confirmed that the Department of Communications, Energy and natural Resources will not be undertaking a feasibility study on the construction of a nuclear reactor (Ryan, 2007). According to Turvey *et al.,* (2008), whilst noting the prohibition on the use of nuclear power in Ireland, states that the whole issue of nuclear power in Ireland is a taboo, and believes that nuclear power is one option which should be debated openly in Ireland, with the facts on nuclear power being freely available.

According to the Turvey *et al.*, (2008), nuclear power is essential to Ireland's future well-being, as it is highly-competitive in cost, taking into full account the cost of waste disposal and plant decommissioning. As noted by the International Energy Agency (2007), the cost of a unit of electricity generated from nuclear power is shown to be on a par with that from coal; cheaper than other fossil fuels and considerably cheaper than wind, which when one considers that as the prices of oil and fossil fuel increase, the economics of nuclear power get better and better. Kelly (2008) notes that on a global level, nuclear power plays a role in the large-scale production of energy, with low carbon dioxide emissions, where countries such as France, Sweden, the Netherlands and the United Kingdom, depend on nuclear power to keep emissions low and help meet climate change targets.

Barrett (2008) states that for too many years Ireland has been opposed to nuclear power, for want of knowledge more than anything else, noting that nuclear energy gives Ireland another option for electricity generation. It is important to recognise all the proposals and alternatives available for electricity generation (Barrett, 2008). Kelly (2008) suggests that the question facing Ireland is whether the country needs to generate nuclear power in the Republic of Ireland, or on the island of Ireland, to secure energy supply and meet climate change targets.

Nuclear Power: International Context

The World Nuclear Association (2007) states that governments are turning increasingly to nuclear power to achieve: (1) national goals of price stability and energy security; and (2) global goals of environmental preservation through reduced carbon emissions. Yeager (2003) stated that electricity generated from nuclear power shows prospects as being a reliable, low-cost source of electricity, providing secure and stable cash flows, offering a hedge against fossil fuel prices and supply volatility and potential to safeguard against escalating environmental requirements. Landis (2007) noted that rising gas and oil prices have pushed up the cost of power and brought nuclear power to a position of clear cost advantage, where from an investor's perspective, the time is now right to invest in companies with existing nuclear power plants. The Sustainable Development Commission (2006) believes that nuclear power competes largely with fossil fuel power; and with the price of fossil fuel, especially oil and natural gas, rising, the competitive position of nuclear power would continue to improve over the next decade.

According to the Royal Academy of Engineering (2004), the European Union will become increasingly dependent on imported natural gas for energy, estimating that by 2030; almost 34% of all energy requirements will be from imported natural gas. The Royal Academy of Engineering (2004), believes that nuclear power is an established technology that can meet base-load energy requirements, with zero carbon emissions. The World Nuclear Association (2007), in addressing the economics of nuclear power, states that nuclear power is cost competitive with other forms of electricity generation, except where there is direct access to low-cost fossil fuel.

According to the International Energy Agency (2005), nuclear power had increased in competitiveness over the previous seven years (since 1998), mainly on the back of rising natural gas prices and higher capacity factors for nuclear plants, with the study stating that findings did not factor in the cost of carbon when calculating the cost of power from natural gas and coal fired plants. The cost of generating power from a nuclear plant was on a par, if not cheaper, than natural gas when compared across 12 countries (International Energy Agency 2005).

The Institute for Energy and Environmental Research (2006), argues that if one takes into account the greenhouse gas emissions associated with uranium mining, transport, processing, storage and disposal, that nuclear energy has advantages over traditional energy sources like coal and natural gas and is environmentally competitive with alternatives like wind power. Duetch *et al.,* (2003), states that nuclear power looks more competitive when the cost of CO2 emissions are taken into account when compared with fossil fuel plants, whilst achieving global carbon emissions stabilisation and reduction targets. The International Energy Agency (2007) notes that the international community is looking to technology to help meet the pressing challenges of energy security, environmental protection, economic growth, and the need for clean energy technologies. Security of energy supply has entered the political debating arena, amid concerns about the ability of both gas and electricity systems to meet peak demands and the realisation that gas and oil self-sufficiency are coming to an end, combined with concerns about the long-term reliability of major overseas sources of supply (Sustainable Development Commission, 2006). The Department of Communications Energy and Natural Resources (2007), believes that Ireland requires robust electricity generation capacity to ensure consistent supply to consumers and all sectors of the economy. According to the Department of the Environment, Heritage and Local Government (2007), there is scientific consensus that global warming is happening, and an economic consensus that the costs of inaction will greatly outweigh the costs of action, and that progressive climate change policies must be based on innovation and investment in low-carbon technology.

Deutch *et al*., (2003) states that studies into the future use of nuclear power is necessary to face the challenges of future energy needs without emitting carbon dioxide (CO2) and other atmospheric pollutants. According to the President's Committee Of Advisors On Science And Technology (2008), a possibility exists for the recovery of uranium from sea water, and with a potential recoverable quantity of some 4 billion tonnes, this could support over 3,000 GW of installed nuclear capacity for 6,500 years. According to the International Energy Association (2006), competitive costs and CO2 mitigation potential are not the only precondition for nuclear power's expansion. Public acceptance, final waste management and proliferation risk are important areas to further address and develop. If not addressed, nuclear power is unlikely to expand and its share in electricity generation might be dropping in the future (International Energy Association, 2006). According to Cummins (2006), through the ban on nuclear power and the refusal to allow debate on the possible use of nuclear power to generate electricity, the Irish government has turned its back on a technology that can help maintain the Irish economy and tackle climate change.

RESEARCH FINDINGS

Main Findings

The main finding of this research study highlights the need for more information on nuclear power to be made available in Ireland. There were 86% of participants, as shown in Figure 1, generally in favour of more information being made available in Ireland on nuclear power. Conversely, only 13% of participants were not in favour of more information being made available.

Fig 1: More Information on nuclear power made available

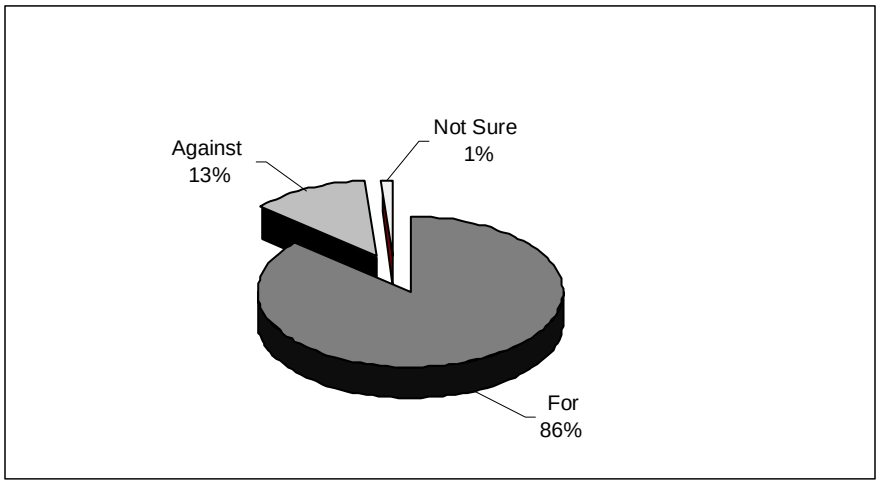
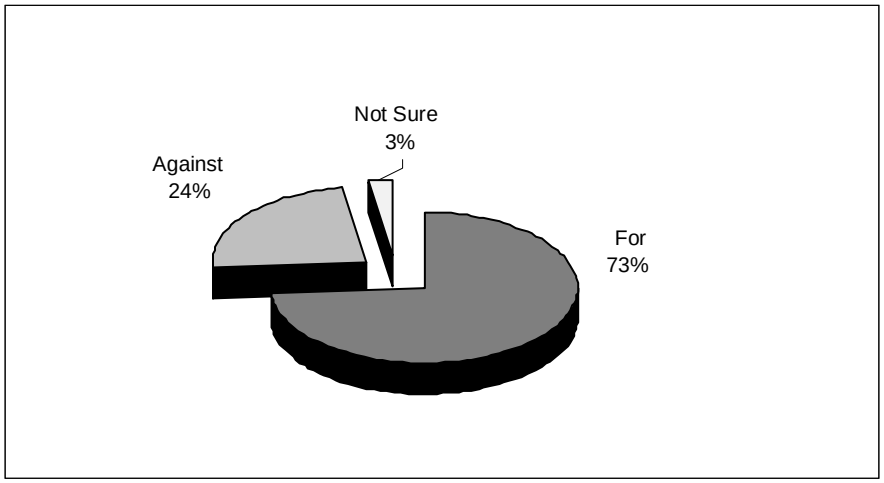


Fig 2: National debate on nuclear power

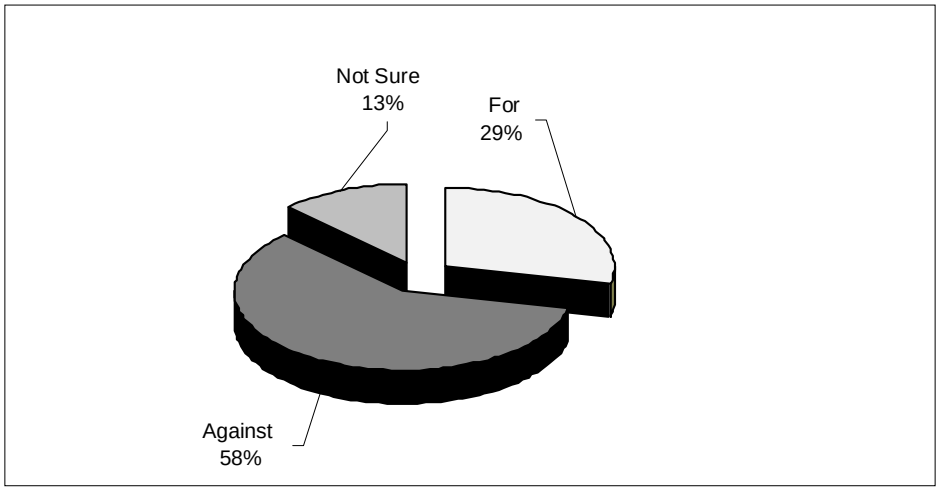


More information on nuclear power being made available in Ireland is supported by 86% of participants (Figure 1), and 73% (Figure 2), are in favour of a national debate on the use of nuclear power in Ireland. Barrett (2008) suggests that nuclear plants are a mystery to a high percentage of the Irish public, and if this issue could be addressed, then an objective debate could take place on the use of one system, rather than another, for the production of energy.

Barrett (2008) went further to state that the element of fear on nuclear power needs to be removed from the debate to obtain a level playing field so that nuclear power can be debated along with other methods of generating electricity. McWilliams (2005) called for nuclear power to be revisited as a potential logical alternative to fossil fuels, given the depletion of the world's fossil fuel resources and the fact that carbon emissions are unsustainable, nuclear power is a logical alternative. McWilliams (2006) also suggests that Irish people should open their minds to the possibility that nuclear power is part of the energy solution, not part of the problem. According to Quinn (2009), Ireland is unable to consider nuclear power plants because of official State opposition to it, with a prohibition on nuclear power written into law as part of the Electricity Regulation Act of 1999, precluding even the consideration of nuclear power.

This current research has found that attitudes and opinions on nuclear power vary depending on the nature of the issues being discussed. This is evident from the findings where, initially, a large proportion of participants are not in favour of building a nuclear power plant in Ireland, but when introduced to concepts such as lower electricity costs, enhanced security of supply and lower carbon dioxide emissions, the participants were marginally in favour of building a nuclear power plant in Ireland. This current research has found that 58% of participants, as shown in Figure 3, were generally against building a nuclear power plant in Ireland, with only 29% in favour.

Fig 3: Build a nuclear power plant in Ireland



This research also found that when introducing the concept of lowering electricity costs through the use of nuclear power, the findings presented a notable change of attitude, where 49% of participants, illustrated in Figure 4, were not in favour of building a nuclear plant.

This finding represents a decrease of 9% (58% to 49%) in participants who are not in favour of building a nuclear power plant in Ireland. Conversely, there was increase of 9% (29% to 38%) of participants who are in favour of building a nuclear power plant.

Fig 4: Build nuclear + lower electricity costs

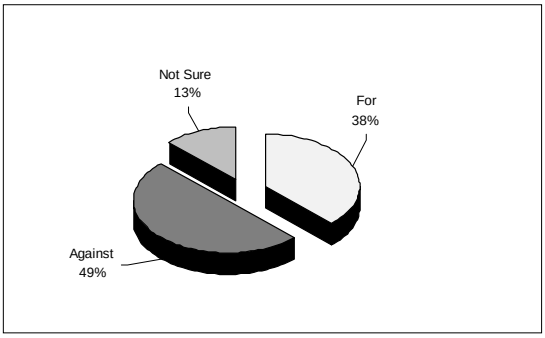
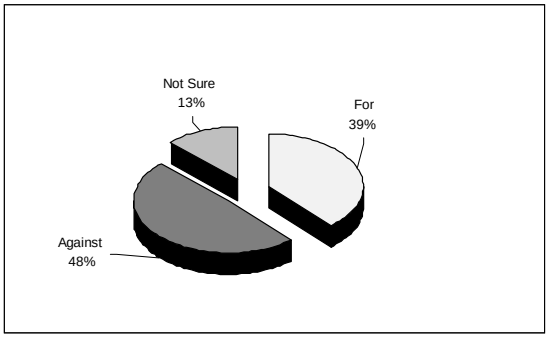


Fig 5: Build nuclear + lower electricity costs + enhanced security of supply

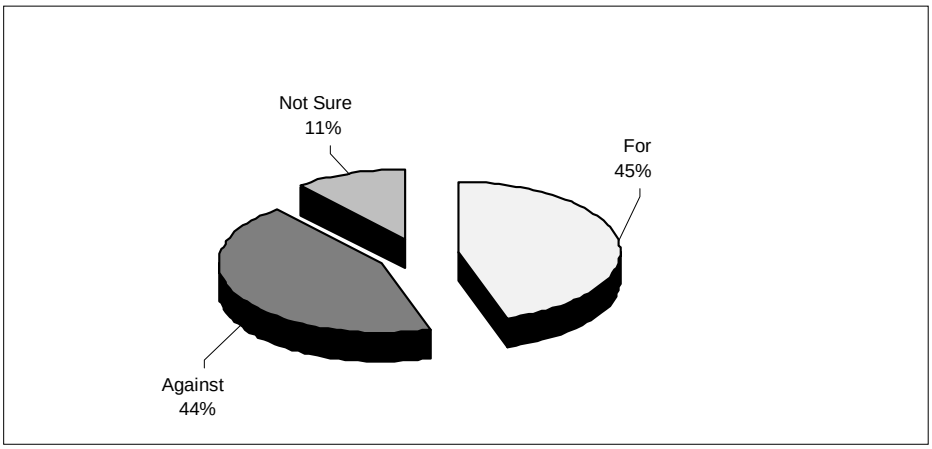


This research found that when the concept of enhanced security of supply was introduced in parallel with the previously mentioned concept of lower electricity costs, there was only a 1% drop (49% to 48%) in participants who are against nuclear power, and no drop in support for nuclear power, as shown in Figure 5.

According to the World Nuclear Association (2007), while there is international recognition of the role that nuclear power has played in satisfying various policy objectives, including energy security of supply, reducing import dependence and reducing greenhouse gas or polluting emissions, nuclear power must demonstrate its economic competitiveness as well as its life cycle advantages. Hutton (2008) states that nuclear power has provided the UK with safe and secure supplies of electricity for more than half a century, being one of the few proven low-carbon technologies that can provide base load electricity.

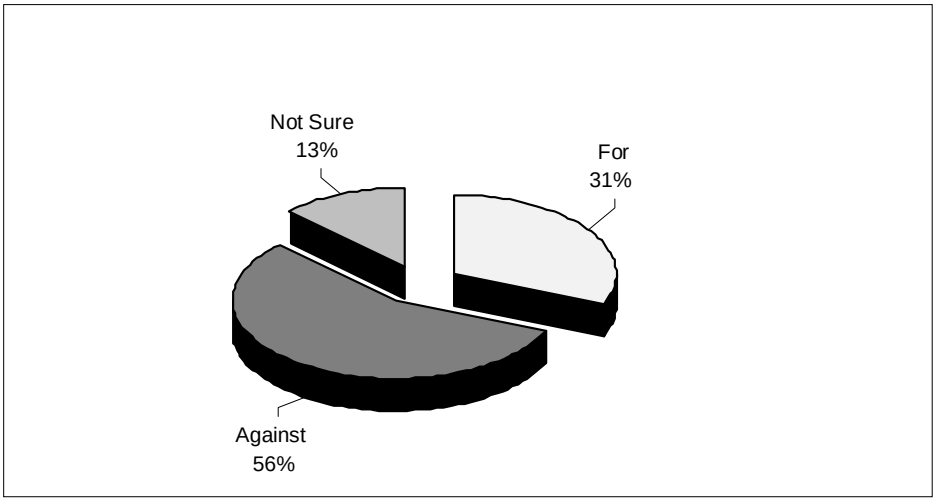
McWilliams (2006) and Quinn (2009) both argue that Ireland cannot assess the merits or otherwise of nuclear power due to the current prohibition on nuclear power. A further significant finding in this research study occurred when the concept of lower carbon dioxide emissions was presented with the previously mentioned concepts of lower electricity costs and enhanced security of supply.

Fig 6: Build nuclear + lower electricity costs + enhanced security of supply + lower carbon dioxide emissions



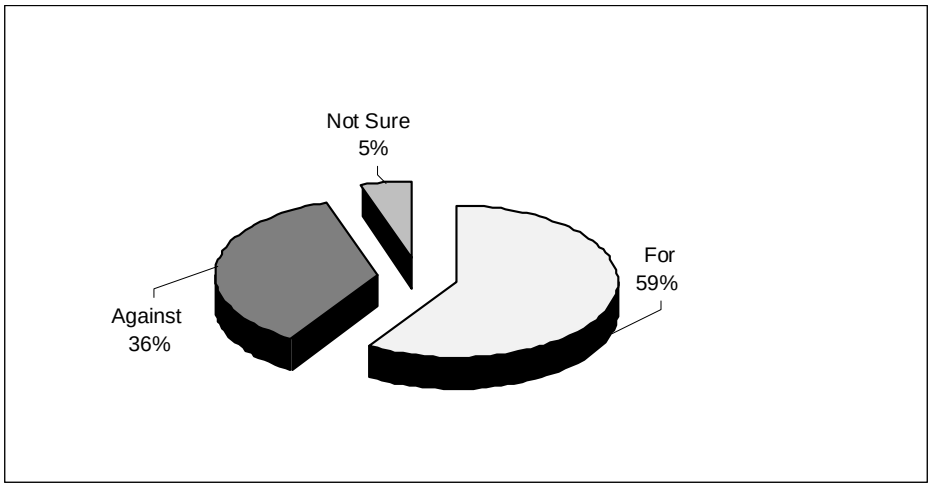
In Figure 6, the findings show that 45% of participants are generally in favour of building a nuclear power plant in Ireland, and 44% against, when the three concepts of lower electricity costs, enhanced security of supply and lower carbon dioxide emissions were introduced together. This finding illustrates a 14% decrease in those participants (58% to 44%) who are not in favour of building a nuclear power plant in Ireland. The findings also show a 16% increase (29% to 45%) of participants who are in favour of building a nuclear power plant in Ireland. This research has also found that participants are generally not in favour of nuclear power being the dominant method for generating electricity in Ireland. The survey revealed that 56% of participants, as shown in Figure 7, are not in favour of nuclear power being the dominant method for generating electricity, with 31% of participants in favour of the proposition.

Fig 7: Nuclear Power as the Dominant Method for Generating Electricity



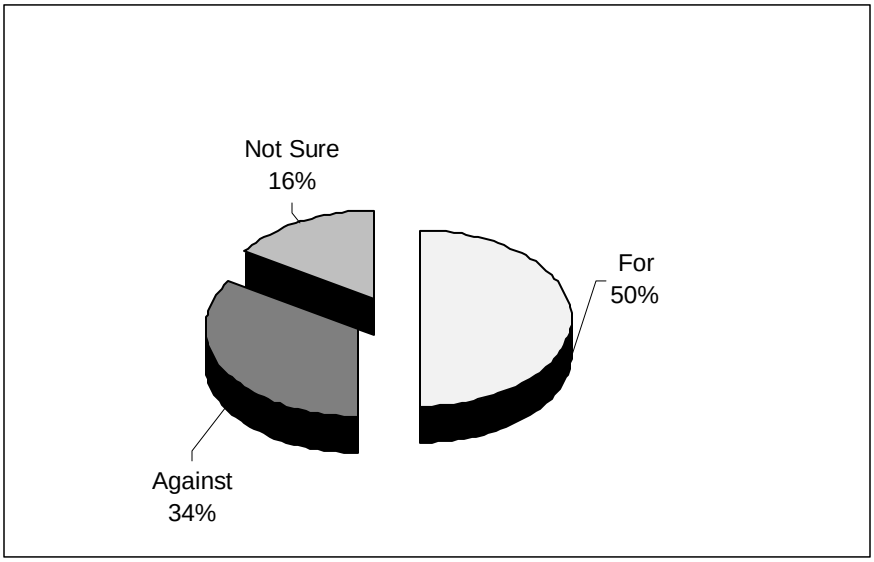
This research has also found that support exists for a feasibility study to be undertaken to investigate the use of nuclear power in Ireland, with 59% of participants believing such a feasibility study should be undertaken, illustrated in Figure 8.

Fig 8: Nuclear power feasibility study



Notably, on the issue of modern nuclear power technology and improved safety, 50% of participants would be in favour of building a nuclear power plant in Ireland, illustrated in Figure 9, if it could be proven that the technology was safer, with 34% of participants not in favour.

Fig 9: Build nuclear power – safer technology



According to Deutch *et al*., (2003), U.S. public attitudes on nuclear power are informed almost entirely by their perceptions of the technology, where views on nuclear waste, safety, and costs are critical to their judgments about the future deployment of this technology. Technological improvements that lower costs and improve safety and waste problems can increase public support substantially (Deutch *et al*., 2003).

RECOMMENDATIONS & CONCLUSIONS

Recommendations

Feasibility Study on Nuclear Power

In light of the findings of this current research study, it is recommended that the Irish government commission a feasibility study into the use of nuclear power in Ireland for generating electricity in the future. This feasibility study should investigate all aspects of nuclear power, especially, the economics of nuclear power, environmental issues, security of supply, safety concerns, waste management, and non-proliferation.

The feasibility study should be carried out by an outside independent organisation, such as the Organisation for Economic Cooperation and Development (OECD), or the European Commission, or other external entity that has the experience and background to undertake such a study, while maintaining a position of impartiality. The feasibility study should look at both the 'pros' and 'cons' of nuclear power and the possibility of providing information on nuclear power in Ireland. 59% of participants in this current research for example, are in favour of such a feasibility study, while 65% of participants believe that nuclear power is a relatively cheap source of electricity, and 73% of participants believe that nuclear power is an environmentally friendly method of generating electricity.

Public Information on Nuclear Power

It is clear from the research findings that more information on nuclear power should be provided to the Irish public. Such information should be fair, impartial and based on actual international studies and experiences. Without additional information, it would be difficult to sustain any national debate on the issue of nuclear power and it potential use in Ireland. The earlier recommended government commissioned feasibility study into nuclear power would ideally be a corner stone of all publicly available information. There is a long history of operating nuclear power plants across Europe and North America from where much information can be obtained, numerous studies and reports published on practically every aspect of nuclear power from operations, costs, technology, fuel (uranium), safety incidents and safety records, environment benefits and non-proliferation. This research has found clear support for more information on nuclear power to be made available to the public, with 86% of participants supporting more information being made available in Ireland on nuclear power.

National debate on Energy Policy and Nuclear Power

The findings suggest that a broad discussion or debate is required on the potential use of nuclear power in Ireland. This however, should form part of a larger debate on Ireland's overall energy policy for the future. Issues such as the economics of current energy policy, the status of environmental targets and future security of supply issues should be debated. In particular, Ireland's dependency on imported fossil fuels should be rigorously debated and a plan for how the country will generate electricity in the event that fossil fuel supplies are exhausted, as is predicted. This recommendation is supported by these research findings which show solid support, 73%, for a national debate on the use of nuclear power. This research also reports findings of considerable support for varying the fuel mix in Ireland to ensure a reliable and secure supply of electricity, but also to reduce carbon dioxide emissions through a reduction in fossil fuel usage and an increase in renewable energy. The Royal Academy of Engineering (2004) state that nuclear power has the lowest lifecycle carbon dioxide emissions of all the current electricity generating fuels and technologies. According to Deutch (2009), reliable and secure electricity is possible using nuclear power due to the fact that uranium resources, the nuclear fuel, are rising faster than consumption, with current resources sufficient to fuel the deployment of 1000 reactors over the next half century.

Conclusions

This current research concludes that nuclear power merits investigation at a minimum, to provide further information for decision making. Yeager (2003) states that nuclear power shows prospects as being a reliable, low-cost source of electricity, offering protection against supply volatility and potential to safeguard against escalating environmental requirements. Aylward (2008) believes that nuclear power is one option which should be debated openly, where Ireland has the facts on nuclear power, and the nuclear option for generating electricity openly considered. According to Fitzpatrick (2008), the Irish government should establish a highly qualified expert group to investigate nuclear power, believing that for too many years, Ireland has been opposed to nuclear power, for want of knowledge more than anything else.

An investigation or feasibility study into nuclear power in Ireland does not mean that the government or, the public, support this particular technology, but it is only fair, that Ireland should be able to debate the matter. It is most unjust that such a prohibition policy is currently in existence. There is evidence of concern for the environment and support for a reduction in carbon dioxide emissions. There is also evidence that renewable energy should play a larger role in Ireland's future energy strategy. Certainly, there is evidence of concern on issues such as nuclear safety and nuclear waste storage. Interestingly, there are clear signals from this research however, that nuclear power is perceived to contain some tangible benefits that may in the future warrant a review of the prohibition on its use in Ireland.

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