

Research paper on nuclear power in usa

[Environment](#), [Electricity](#)



Introduction

The nuclear power plants utilize heat that is produced by fission to generate steam. This steam that is produced is used to drive a turbine which subsequently generates electricity. Setting up nuclear power plants involves high investment costs but the variable operating costs are low. Due to these low operating costs as well as design factors, the nuclear plants in the United States of America operate entirely are “ base-load plants” and are characteristically “ the first in a power system’s order” (Kaplan 17).

There have been recommendations that the U. S is supposed to build more nuclear energy plants as a response to the ever increasing high natural gas as well oil prices and the ongoing concerns regarding global warming. Those who support these recommendations point out that nuclear power is the only large-scale source of energy which does not make a contribution towards global climate change. The U. S energy department has been working with the industry to identify sites for new reactors that are safer and the Congress has given its approval for subsidies for companies which set up the first plants. Those who are against this idea point out that accidents and terrorist attacks on the reactors could bring in contamination on large areas, and they also point out that there could be stealing of the nuclear fuel to be used in making weapons. These opponents point to the idea that the U. S “ does not have an acceptable, long-term policy for managing nuclear waste and that renewable energy is safer, cleaner and more affordable”(Weeks 217). The question to be answered in this research paper is: should the U. S build more nuclear power plants? In this paper, it is going to be argued that the United

States of America should build more nuclear plants as a solution to the increasing problem of energy crisis and also as a solution to the problem of global warming that is currently affecting the world negatively. Reliance on such sources as natural gas and oil that are characterized by the very increasing prices and that bring in carbon emissions that contribute to the problem of climate change should be avoided at all costs. This paper is going to give the background information concerning the topic. There is going to be a review of the literature concerning whether or not more nuclear plants should be set up in the United States. This will be followed by presenting data that is relevant to the topic which will then be analyzed. Data analysis will involve looking the data presented and the literature that has been reviewed. The paper will end by giving the summary of the discussion. There is also going to be using of the tables and charts in the research paper that presents some relevant data will make the analysis to be carried out in a more efficient manner.

Background: Review of the Literature

According to Ferguson and Marburger, even if no single source of energy provides a cure-all, nuclear power has to play a significant role in the reduction of the use of fossil fuels in the U. S. In the month of February 2010, President Obama made an announcement of an 8.3 billion US dollar loan guarantee for a power company with a hope of setting up two new reactors and the Congress asked for more 36 billion dollars in loan guarantees for the same projects. This is a critical portion of the policies as well as finance mechanisms that have to be put in place for a competitive and sustainable nuclear power industry to develop. The demand for electricity in the United

States is expected to increase by nearly 30 percent by the year 2035 (Energy Information Administration 1). The required investment in energy that makes it possible to meet this demand is bigger than it first seems to be for the reason that a larger number of coal as well as nuclear plants are “ past the middle-age of their permitted 60-year” (Ferguson and Marburger 392).

It is pointed out that by the year 2035, over 50 per cent of the nation’s coal plants and “ 40% of the nation’s nuclear capacity will be retired unless the plants receive operations extensions” (Energy Information Administration 1). Over the past decades, the most preferred fuel for new electrical capacity has been natural gas. It is pointed out that “ resource discoveries and advances in extraction technologies have made natural gas seem inexpensive” (Ferguson and Marburger 392). However, while the demand for gas in heating, transportation and cooking in the United States increases, it is projected that its price will as well increase. The “ natural-gas-electricity” is greatly prone to changes in price and cost of fuel can account for over 70 percent of the total generation cost, compared with around 30 percent for coal and 15 percent for uranium-fueled nuclear (Ferguson and Marburger 392). The best policy would be one that supports reducing the use of natural gas in generating electricity.

According to Farmer (393), the nuclear power costs “ from the cash investment to the risks of proliferation, disaster and environmental harm, are simply too high - especially when one considers that many of the true costs are obscured by government subsidies” (Farmer 393). Farmer points out that

lucky enough; there are many workable alternatives that have low-to-zero carbon dioxide emissions. He points out that the U. S could theoretically be supplied by solar power plants and also that, wind energy could generate about nine times the present yearly United States electricity generation (Farmer 393). However, on the other hand, Ferguson and Marburger oppose this idea by pointing out that; even if theoretically, the renewable energy technologies which include wind and solar have the potential of fulfilling the energy needs of the world, and will be a main component of the future low-carbon electricity mix, “ intermittent nature of these technologies currently prevents them from being a viable source of steady, base-load electricity today, nuclear is the only available, proven and affordable large-power and near-zero carbon emission electricity generation” (Ferguson and Marburger p. 392).

It is projected that by the year 2035, a minimum of 28 new 1000-megawatt reactor’s will have been set up just in order to keep offering the “ business-as-usual” level of twenty percent of the United States electricity demand, in light of the growth in forecast electricity needs and also the “ impending retirement of existing power plants” (Ferguson and Marburger, 2010 392). At the present, there are nineteen license applications for some thirty reactors that are filed with the US NRC or National Regulatory Commission. This activity comes after a long pause since building a nuclear plant in the U. S was last licensed in the year 1973. It is quite important that applications for about this number of new reactors to be set up get approval and that the policy should be set up that facilitates their success (Ferguson and Marburger 392).

There may seem that the cost of nuclear plants is exorbitant. A big nuclear plant typically requires a starting capital investment of about six to nine billion US dollars and it takes approximately ten years to permit and set up. However, an improvement can be carried out on this. In the recent times, the Korea Electric Power Corporation (KEPCO) won a contract to set up four 1400-megawatt reactors in UAE at cost of twenty billion US dollars. It is expected to take about forty eight months to construct and this time it goes in line with the build time of the most recent South Korean reactors. By imitating the efficiencies of KEPCO and reforming the regulatory process, “ the total build time in the United States could be reduced, shrinking capital cost and cost and visitor risk” (Ferguson and Marburger 392).

Nuclear power brings in some significant risks; there exist no “ inherently safe” nuclear plant. However, such risks can be made to be manageable by putting in place the best practices all through the industry and also by bringing improvement in controls. For instance, the motivation for weapon-capable states to turn out to be nuclear-armed can be alleviated through formation of the security alliances as well as through monitoring (Ferguson and Marburger 392).

Data

At the present, there are thirty one states in the United States of America that have nuclear reactors and the largest producers include such states as Vermont, South Carolina, New Hampshire, Illinois, Virginia and Connecticut (See table 1). These power plants are 31 in total and they are operated by 30 different power companies. In the year 2009, these nuclear power plants

realized a capacity factor of 91.1 percent and generated 799 billion kWh and accounted for 20 percent of the total amount of the electricity that was generated. In the year 2010, there was generation of an increasing amount of electricity from this source by nuclear plant of about 807 billion kWh (Nuclear Power in the US, 2012) - See table 3. In general terms, there has been an increase in consumption of energy in the United States and this and this trend is expected to continue in to the future. The U. S is a major consumer of nuclear energy and the consumption level takes a substantial percent of the world's total consumption of this form of energy (see table 2).

There great expectations that increasing the level of nuclear power generation will offer to a solution to the problem of climate change. This source of energy does not contribute to carbon emissions that have causing the problem of global warming and it is also expected that it will also not contribute to this emissions in the future (See table 4). Chart 1 also points out that nuclear energy is the source on which increased use leads to ten percent of the reduction of carbon emissions.

The Research (Study)

The United States of America has been consuming nuclear energy for a long time. However, the question that has come in has been in regard to whether or not more nuclear plants should be built in the United States. Arguments have come up, with some people supporting the idea of increasing the number nuclear plants in the United States as a meeting the increasing energy demand and solving he problem of global warming but some other people have been against this idea. It has pointed out that by those against

the idea that setting up more nuclear plants will require huge amounts of money and the nation is not able to afford this. It has also been found out in the literature that increasing the number of nuclear plants may lead to their misuse and may contribute to people using them to create dangerous weapons that might be a threat to the country and to the world as well. It has also been pointed out that other renewable source of energy such as wind and natural gas may be used instead since they may seem to be a main component of the future low-carbon electricity mix.

However, despite these oppositions, careful analysis reveals that the U. S future needs will depend on the increased production of nuclear energy. At the present, production of nuclear in the U. S forms a substantial percent of all the energy sources in the country (about 20 percent). In addition several states, as indicated in table 1, in the country have shown their commitment to produce more and more nuclear energy which forms a larger percent of their total energy production. The problems that have been pointed out by those that are against increased level of nuclear production have not been encountered by these states. Therefore, it makes sense for all states to depend on nuclear power as their main source of energy. Having such as state as Vermont generating 73.3 percent of its energy from nuclear is quite promising.

It has also been pointed out in the literature that the initial investment in setting up a nuclear power plant is quite high, as high as about six to nine billion US dollars and it takes approximately ten years to permit and set up. But it is wise to look in to the future. It should be realized that the operating

costs are low are compared to other sources of energy and this makes this source of energy to be affordable by a large number of people. Increasing the nuclear plants in the United States will enable people in this country to avoid incurring the high costs that are associated to other sources of energy such as oil. The oil prices have been unpredictable and they are expected to increase in the future. There is need for the United States is supposed to improve efficiencies and align regulatory process and this will lead to having the total build time reduction and there will be shrinking of the capital cost.

There has been the idea, as it has already been looked at, that nuclear power brings in some significant risks, especially the risk that people can use the nuclear energy in making the nuclear weapons. This is actually true and there is no assurance that building nuclear plants can not bring in significant risk. However, such risks can be made to be manageable by putting in place the best practices all through the industry and also by bringing improvement in controls. Strong policies should be put in place that guides the production and consumption of nuclear energy.

Research has also been conducted in order to determine whether use of nuclear energy can help in dealing with the problem of global warming. It has been found out that global warming is brought in by carbon emissions. The increase in the level of carbon emissions is brought about by the emissions produced by such fuels as oil. To help clear this problem, the use of such sources of energy need to be eliminated and this be substituted by the use of nuclear energy. Table 4 indicates that no carbon emissions are produced by the nuclear energy. The table indicates the projected

greenhouse emissions from the year 2005 up to year 2010. Even as it is indicated in the table that the generation of nuclear energy has been increasing and will still increase in the future, there is no indication of the possibility that nuclear energy will produce the greenhouse emissions. This is evidence enough that indicates that there is need to build more nuclear power plants as a solution to the climate change problem. Still on the issue of global warming, Chart 1 indicates that increased nuclear power production will contribute to 10 percent of the total carbon emission reduction. This indicates that increasing the use of nuclear energy has the potential to bring down the level of carbon emissions. Following the high prices associated to other energy sources as fossil fuel may discourage their future use and therefore, the problem of looking for ways of how to use such fuels to reduce carbon emissions may not exist the solution would have already been offered by using nuclear.

Summary and Conclusion

The United States of America should build more nuclear plants. It is expected that by the year 2035, the demand for electricity in the use will increase by over thirty percent. This poses a threat to the population and the solution can only come from increasing power generation. However, there is also a possibility that the prices of energy sources that are currently relied much upon such as oil and natural gas will increase to substantial levels. Moreover, at the present, there is the problem of global warming and this problem is expected to persist in the future unless appropriate measures are taken. Carbon emissions are the ones that mainly cause this problem they come from the use of such sources of energy as oil. Therefore, in order to prevent

producing more emissions, the use of such sources of energy need to be discouraged.

In essence, the problems that have been pointed out (high prices and global warming) make it quite necessary for the United States of America to build more nuclear plants. Even if building these plants are associated to high costs, eventually, there will paying low prices by the consumers following the low operating costs. The investing in these plants is worthy. To prevent any risks that may brought in by building more plants, there is need to put in place appropriate policies that will the production and use of the nuclear energy in the United States of America.

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Source: Projected greenhouse emissions, 2010.

Source: International Energy Agency (IEA). <http://iea.org>