

## **Benchmark II**

### **Objective I**

In the United States there are a few organizations that control nuclear energy use. One organization is the International Atomic Energy Agency (IAEA). This organization is more of a world agency rather than just the United States. It was set up in 1957 by the United Nations, as the world's "Atoms for Peace" organization. This agency works with its partner states and other organizations to promote safe, secure, and peaceful nuclear technologies. The IAEA is centered in Vienna, Austria. Other offices are located in Geneva, Switzerland; New York, USA; Toronto, Canada; and Tokyo, Japan. Some laboratories are located in Vienna and Seibersdorf, Austria; Monaco; and Trieste, Italy. There are over 2200 people employed from over 90 countries. The Agency is currently led by Director General Mohamed ElBaradei and six Deputy Directors General who head the major departments. "The IAEA's mission is guided by the interests and needs of Member States, strategic plans and the vision embodied in the IAEA Statute. Three main pillars - or areas of work - underpin the IAEA's mission: Safety and Security; Science and Technology; and Safeguards and Verification." (The "Atoms for Peace" Agency). The IAEA reports annually to the UN's general assembly and when needed, to the UN's Security Council on states that will not comply with international law. "In recent years, the Agency's work has taken on some urgent added dimensions. Among them are countermeasures against the threat of nuclear terrorism, the focus of a new multi-faceted Agency action plan." (History of the IAEA).

Another organization that pertains to nuclear energy and the use of it is the United States Nuclear Regulatory Commission (NRC). It was created by congress in 1974 as an independent agency to enable the nation to safely use radioactive materials for beneficial civilian purposes while ensuring that people and the environment are protected. They also regulate nuclear power

plants and other uses of nuclear material such as nuclear medicine by inspecting, licensing, and enforcing its requirements. Their mission is to “License and regulate the Nation's civilian use of byproduct, source, and special nuclear materials to ensure adequate protection of public health and safety, promote the common defense and security, and protect the environment.” (NRC Strategic plan). “The NRC's scope of responsibility includes regulation of commercial nuclear power plants; research, test, and training reactors; nuclear fuel cycle facilities (also called fuel cycle facilities); medical, academic, and industrial uses of radioactive materials; and the transport, storage, and disposal of radioactive materials and wastes. The NRC oversees 104 nuclear power reactors 36 non-power (research and test) reactors, 47 uranium recovery sites, 9 major fuel cycle facilities, Approximately 4,500 medical, industrial, government, and academic materials licensees.” (NRC).

There are also many treaties that pertain to nuclear energy. One such treaty is the 1963 Limited Test Ban Treaty. It is an agreement between the US, USSR, and UK which prevented nuclear testing above ground, underwater, and in outer space. But it does allow testing to occur underground as long as the radioactive fallout is not widespread. A total of 116 countries have signed this, and China, who had not signed, did testing in 1992 that violated the treaty's guidelines. (Nuclear treaties and agreements). Another treaty is the 1967 Outer Space Treaty. An agreement between the US, USSR, and UK which banned placing weapons of mass destruction in orbit, on the moon, or in any other location in outer space for military purposes. Eighty-six nations have signed this agreement. Another treaty is the 1968 Nuclear Non-Proliferation Treaty, which is an agreement among the US, USSR, UK, and 133 non nuclear weapon countries, which prevented the spread of nuclear weapons. It made sure that non-nuclear-weapon countries did not start weapons production. This treaty was made permanent in May 1995. 1972 Strategic Arms Limitation Treaty I ABM treaty is a treaty between the US and USSR which limited the anti-ballistic missile systems to a maximum of 100 ABMS launchers and missiles. It also prohibits

the testing and application of any of these components

1972 Strategic Arms Limitation Treaty I Interim Agreement is an agreement between the US and USSR keeping the number of strategic ballistic missiles at the same level for 5 years. The construction of more ICBM silos was restricted, but SLBM launcher amounts could increase if there was a reduction in ICBM or SLBM.

1979 Strategic Arms Limitation Treaty II is an agreement between the US and USSR which put a limit on offensive weapons systems and strategic systems. A 2,400 limit was put on amount of strategic nuclear weapon delivery vehicles, and a max of 1,320 was put on MIRVed ballistic missiles. The U.S. voided the treaty in 1986.

1987 Intermediate-Range Nuclear Forces Treaty (INF) is a treaty between the US and USSR which bans all intermediate range missiles (IRMs), short range missiles, and all associated facilities and equipment. On-site inspection is used to make sure that both countries are following the treaty.

1991 Strategic Arms Reduction Treaty is an agreement between the US and USSR which limited the number of strategic nuclear delivery vehicles to 1,600. It also limited the number of warheads per country to 6,000; this treaty reduced the U.S.'s and Soviet's warheads by 15% and 25% respectively.

## Objective II

In 1957 Mr. Dwight D. Eisenhower, President of the United States of America prompted



the creation of an organization that would oversee all matters with nuclear proliferation. More or less using atoms for peace, this was its slogan until it was named the International Atomic Energy Agency (IAEA) (The Atoms For Peace Agency). The organization was set up to work with member states of the

United Nations, its priorities set by what member nations deem important. Since the creation of the IAEA the agency has seen legitimate and illegitimate spread of nuclear technology and materials (Zak,96).

For example, when the nation of Israel was established after the end of World War II by the United Nations tension brewed between it and neighboring countries. Syria, Palestine, and Iran to name a few. Through out its years it has seen war and terrorism so when Israel was given the means or the opportunity to posse's nuclear weapons it took it with open arms (Atoms for Peace). This of course shot tensions to an all time



high. Many of the Middle Eastern countries cried foul and demanded that their countries be given the technology to build and produce its own arsenal of nuclear weapons.

This is when the IAEA steps in and sees if the purpose of the technology and material going to serve the better good or if it will bring upon chaos to the world. At times the spread of nuclear “know how” is needed to help developing countries cope with its growing population

and needed for energy but when the means are given and used for something they were not intended for then the world will deal with grave consequences. This is the dilemma the IAEA is plagued with should it allow nuclear technology to be sent to a country in order to help as it develops into a state that will provide for its people as well as provide for the future of the state. For example China has grown rapidly into an enormous world economy, with a hunger for electricity to match it. Now it currently burns fossil fuels to power its newly emerging industrial sector, it consumes almost the same amount of oil the United States (U.S.) does.

As global warming becomes the top issue for numerous world governments different means of producing electricity are needed, nuclear power plants have been the main topic of discussion. Proliferation of nuclear technology to power the needs of emerging world populations have taken center stage, but with the means of producing electricity through volatile and dangerous materials are given to countries around



the world the possibility of it being used to produce weapons can be precipitated in the climate the world is in today. The need to allow countries access to this type of technology is needed not only to keep diplomatic relations at a high level but it is also needed to keep the well being of humans all around the world. Differences will always be noticeable but differences must be set aside to allow the field of nuclear technology to flourish and provide for a brighter future for generations to come (Cravens, 84).

For example Iran a Middle Eastern country has been noted to have a quick growing nuclear program (Iranians Nuclear Program...). The government of Iran states that the nuclear program is for peaceful uses only like production of electricity. Russia, and China have assisted

Iran the production of nuclear power plants and uranium enrichment facilities (Timmeran,95). The U.S. has been an outspoken about its dislike of the notion that Iran has the capabilities to produce weapons grade uranium.

The Iranian government denies any pursuit in proliferation of nuclear weapons, but one of its greatest enemies called out by the Iranian government Israel has had nuclear weapons,



tensions between the two countries is at an all time high (Jafarzadeh,76). An eminent attack by Iran on Israel is quite visible if Iran acquires nuclear weapons. The same can be said about the countries of India and Pakistan.

The country of Pakistan came to be after the death of Gandhi a religious and ethnic separation occurred and Pakistan came to be. With a brighter outlook

the countries of India and Pakistan a break away state from India both posses nuclear weapons though tensions are high between the two countries neither of them seem capable of actually using them in war because the chance has never been given (Zak,73).

On the same note other than Iran, which has a virgin nuclear program, another world government one of which has had a history of defying sanctions and checks placed upon it by the U.N., North Korea has had an active nuclear program (Mansourov,105). Successfully, testing a nuclear weapon near the border of China, the test was done underground and faint shock waves were felt in the Easter costal cities of Japan. The North Korean government openly stated that



it wanted and intended to produce nuclear weapons, but after this happened it would suspend its nuclear program. After the test was done North Korea indeed terminated its nuclear program and not much has been heard from it since the successful test of a nuclear weapon (Nuclear Weapons

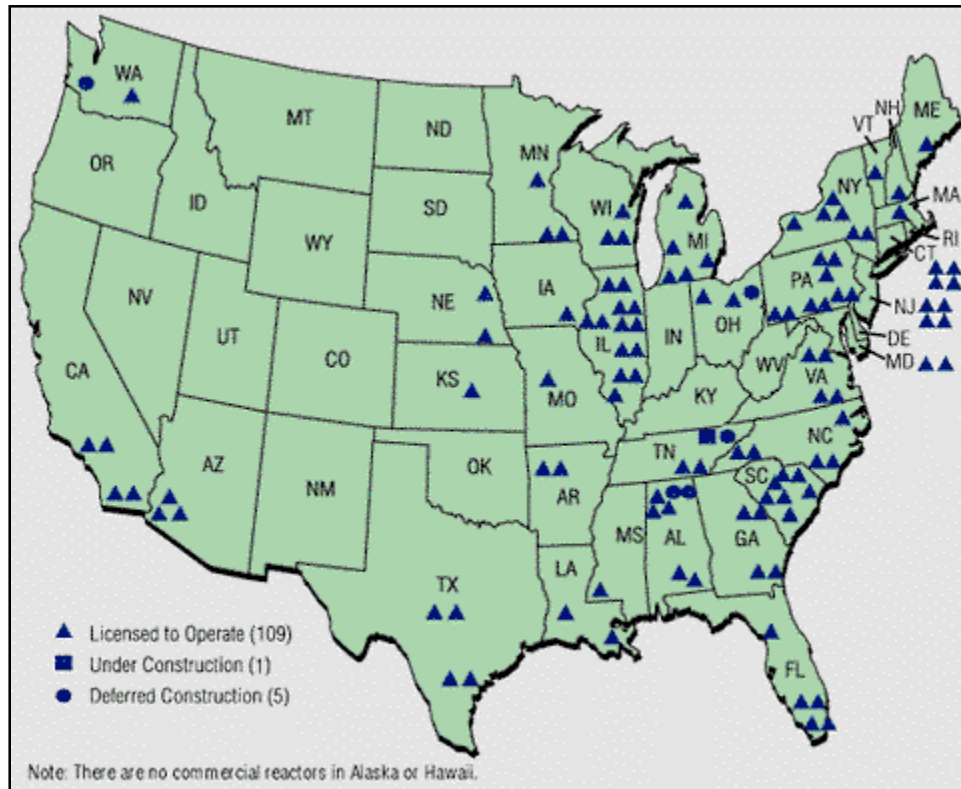
Program: North Korea). The IAEA was closely intertwined in North Korea's nuclear program and no harm came out of it.

It seems that a regulatory agency that will overlook all matter pertaining to once area in this case nuclear technology proliferation works to make that subject area as safe as can. The need for the spread of nuclear technology is at its peak. New generations of humans are being born into an age in which once you flick a switch light needs to come, a sense of expectation comes around us with these simple tasks. We expect things to happen because we have grown used to them taking this away will only bring about chaos among some of the most prominent nations in the world. In the times we live in which the major source of power producing technology is actually destroying the future we must act to counteract this without given up basic necessities like warming a house in midwinter.

In short the spread of nuclear technology is needed and will not stop. In order to keep ourselves safe from rouge states and terrorist organizations we must work as one. As stated before the basic necessities that we are born with other developing nations do not have, the power is not there to keep thousands of homes warm during frigid winters, and have them cool during scorching summers. The only way to keep our future secure and allow others to have a higher level of living the proliferation of nuclear technology is a must.

### Objective III

Nuclear energy was only recently considered to be “an exotic, futuristic technology, and the subject of experimentation and far fetched ideas.” In the United States alone, there are more

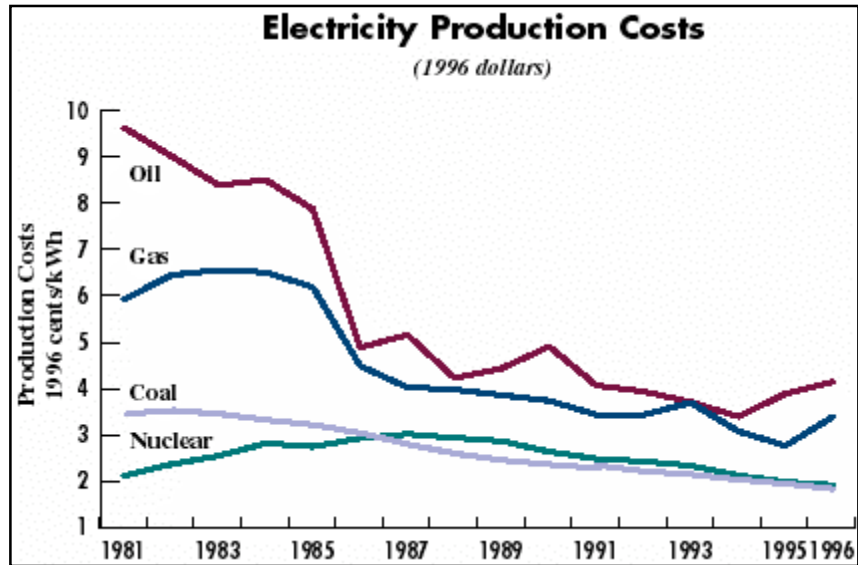


than 110 nuclear power plants that supply as much combined energy as oil, natural gas, and hydropower, saving American consumers approximately \$44 billion since 1973. There are several

strong economic and environmental benefits to the uses of nuclear power plants, despite various risks and drawbacks to the production of nuclear energy.

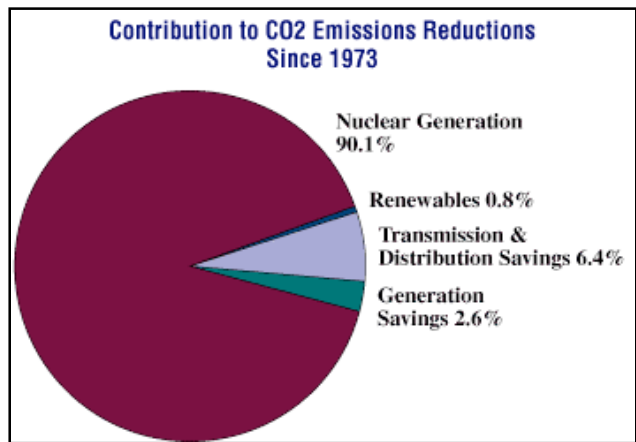
One of the benefits of the uses of nuclear energy is the empowering of the global economy. Since the oil embargo of 1973, the economy of the United States has grown about 50 percent, while its total energy use has grown about only 10 percent. Between the years of 1973 and 1990, the GDP (the measurement of a nation's wealth) of the United States, grew by an amount of about 50 percent. In the same period of time, electricity use grew by approximately 58 percent. From this information, it can be concluded that in order to meet the needs of a strong economy and a growing population, any country must have reliable supplies of electric power. The United States nuclear power plants produced 674 billion kilowatt-hours of electricity in

1996. This was a greater amount of electricity than the entire country consumed in the early 1950s. On a global scale, a total of over 400 nuclear power plants, operating in 25 countries around the world, supply



17% of the world’s overall generated electricity.

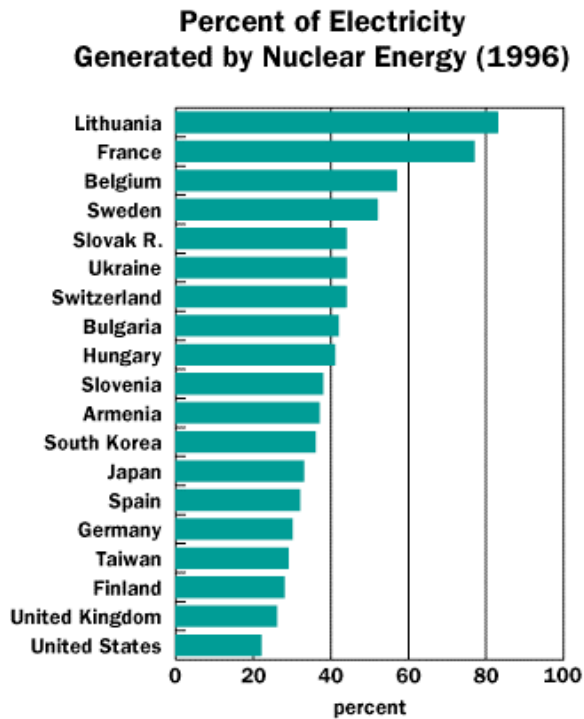
Another great benefit of the use of nuclear energy is the protection of the Earth’s environment. Nuclear power plants produce electricity through the fission of uranium, rather than the burning of unclean fuels. On the other hand, nuclear power plants do not pollute the air



with nitrogen oxides, sulfur oxides, dust, or greenhouse gases such as the likes of carbon dioxide. America’s nuclear plants reduce the production of greenhouse gases by a substantial 20% (128 trillion tons) each year. Without nuclear energy, the electric utility emissions of nitrogen oxides, as well as sulfur

dioxide, would each be 2 million and 5 million tons higher each year, respectively. Due to this, the world’s dependence on foreign oil has been cut drastically. For example, in France from 1980 to 1986, SO2 and NOX emissions in the electric power sector were reduced by 71% and 60%, respectively, causing reductions of 56% and 9% respectively, of total SO2 and NOX emissions in France. Still another environmental benefit of the use of nuclear power is the

alleviation of 1,600 million tons (8%) of carbon dioxide emissions each year. Despite issues, nuclear energy has become an extremely beneficial alternative fuel source for the world to enjoy.



*Source: International Atomic Energy Agency*

Safety has been one of the key factors that have played a prominent role in the design of nuclear power plants. For example, in the city of Chernobyl around 1:23 local time one of the nuclear reactors exploded, spewing radiation all across the Earth. The accident can be attributed to many factors. Some say it was human error, while others blame design flaws. In close examination of the incident both can be blamed. Technicians could have stopped the catastrophe from happening if closer attention to what has happening was given. Also, the design of the Soviet reactor had no fail safe system installed.

Many of the reactors that were in use in the Soviet Union around that time worked on the following concept, the hotter they got the more energy it produced; the colder it got the less energy it produced. This presented a problem, being that once a nuclear reaction occurs it gives off tremendous amounts of heat. Here in the U.S., the nuclear reactors work on the complete

opposite concept, the colder it is, the more energy it produces; the hotter it gets, the less energy it produces. That by itself is a safety feature the Chernobyl reactors did not have. Once a reactor reaches a certain temperature it will shut it self-down, the Soviet reactors just produced more energy. This contributed the most to the disaster.

After Chernobyl, many of the nuclear reactor manufactures opted to take the design the Americans had because there would be no chance of an incident ever occurring, thus keeping populations safe from lethal amounts of radiation. As far as safety is concerned many of the reactors on line at this very moment can be left unattended without having to worry about them. Failsafe mechanisms have been set to stop the reactors from ever reaching a critical mass point that would make them explode. Safety and security are in the forefront of design and regulations set fourth by regulatory agencies.

With the production of nuclear energy comes the waste factor what to do with the highly radioactive materials that come out of a nuclear power plant. Currently no real method of disposing this radioactive material is in place, what is done is just containment of the waste. It can be either put in silos under water ore bury it under concrete. Both of these methods keep us safe from being exposed to radiation but they don't help speed up the process of decomposition. The average time span for waste to completely disassociate it self into its simplest components is just around 700 years. Many would argue that just leaving this waste buried somewhere beneath a mountain is the most practical way to deal with the waste, but the problems is that it is still there. Any accident that could happen when transporting the waste from the nuclear power plant to a waste facility would endanger the lives of millions.

Also, the potential of risk of having terrorists get their hands on barrels of nuclear waste is not ideal. The risk of this toxic waste being used as a means of terrorism and a weapon of war against innocent civilians hits a noticeable note in the ears of many politicians and regulatory

agency directors. The waste that comes out of nuclear facilities will still have remnant particles of fissionable material that can be used to produce a dirty bomb. So agencies like the IAEA have set forth stringent regulations that need to be met in the storing and transportation of radioactive materials. So actions against an innocent population with nuclear materials could never be used.

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