



Oasis International School Model United Nations

General Assembly

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Guiding Package

Topic (2) : The Sustainable Management of Nuclear Energy

9th Annual OISMUN Conference

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I. Abstract:

Uranium is one of the world's rarest minerals, forming almost 2% of the earth's crust¹. However, it is a prime source of energy due to its radioactivity. One pound of uranium has as much energy as three million pounds of coal. The energy produced from uranium is named Nuclear Energy. This particular type of energy presents several advantages and disadvantages on the ecosystem. As stated the amount of energy in Uranium greatly trounces more than in fossil fuels, and that is due to the excess of radioactivity. However, being more radioactive renders it more hazardous to human health. It is a fact that the use of nuclear energy reduces the greenhouse effect seen as nuclear power plants do not emit carbon dioxide in the atmosphere, on the other hand, it creates nuclear waste which is extremely hazardous and indecomposable. To this day, nuclear waste has not been a primordial source of danger due to its small amount relative to the energy produced from nuclear power plants. Furthermore, sixty years of study has provided scientific consensus that deep geologic disposal is the best thing to do with nuclear waste. However, that is a source of issue in the future due to the limited amount of areas nuclear waste can be buried in. Also nuclear waste management is an extremely costly process due to the encasement and the isolation it demands. This creates a controversy around nuclear energy and whether its advantages outweigh its disadvantages or the opposite.

II. Introduction:

¹ ANONYMOUS, *Facts about Uranium*. Available on: <http://www.livescience.com/39773-facts-about-uranium.html> , consulted the 29th of August

Nuclear energy provides over 11% of the world's electricity², which translates to the existence of about 440 **nuclear power reactors** in 31 countries. Since the dawn of humanity, resource issues were not necessarily important, however it is after the industrial revolution that human induced epidemics started taking over. The management of nuclear energy has yet to be a catastrophic problem to the **ecosystem**, however it is sane to put the fire out before it spreads, seen as it will make it more difficult. It is not deniable that nuclear energy does present a lot of advantages and that it is an extremely better substitute to **fossil fuels**, in the time being, still, that does not make it the most efficient solution. On the other hand, it does also present several disadvantages that are:

1. **Radioactive Waste:**

Waste produced by nuclear reactors has to be disposed of at a secure isolated and safe location since they are extremely hazardous. Nuclear waste emits a lot of **radiation** with duration of over tens and thousands of years. The radioisotopes within the radioactive waste, contaminates water and sand rendering them dangerous. On a further note, nuclear waste, also called **fission fragments**, can only be recycled for making nuclear weapons.

2. Nuclear Accidents:

Natural disasters are impossible to predict beforehand, however measures may be taken to protect humankind. Likewise, nuclear accidents have a high risk of taking place³, causing devastating consequences on humans⁴ and their environment.

3. Nuclear Radiation:

² ANONYMOUS, *World Nuclear*. Available on: <http://www.world-nuclear.org/information-library/current-and-future-generation/nuclear-power-in-the-world-today.aspx>, consulted the 29th of August

³ Ex: Power plants explosion and radiation leaks.

⁴ Health problems such as: nausea, vomiting, diarrhea and fatigue.

Certain power reactors produce plutonium, which isn't a present element in nature. It is a by-product of the chain reaction and is proven to be extremely harmful if dispersed in nature, also it is primarily used to create nuclear bombs.

4. High Cost:

The cost to create and build nuclear power plants is extremely high. This is a luxury not presentable to developing countries.

5. National Risk (security):

Nuclear energy is the main source to creating weapons of mass destruction. Thus, nuclear power plants have to be tightly secured; to not be attacked by any terrorist organization. If in the wrong hands, nuclear energy can be internationally devastating.

On the other hand, nuclear energy has also proven to be an alternative to fossil fuels due to its array of advantages, such as:

1. **Greenhouse gas emissions:**

The production of nuclear energy does not emit greenhouse gases, thus has no adverse effect on the ecosystem. However during the transportation and the extraction of energy, few greenhouse gases are released. In comparison with the amount released when producing energy using fossil fuels, the greenhouse gas emissions are negligible.

2. Efficiency:

Nuclear energy is one of the most efficient energy sources; since the smallest amount of Uranium is a rich source of energy and can produce power for a prolonged duration.

3. Ease of transportation due to low fuel cost:

Due to the little amount of Uranium required to produce energy, its transportation is much easier than fossil fuels (28 grams of uranium = 100 metric tons of coal)

4. Excess of supply:

Nuclear energy supply is expected to last for one hundred years, exceeding the life expectancy of fossil fuels and other forms of energy. Thus, its continuous supply makes it an efficient choice of energy in this era.

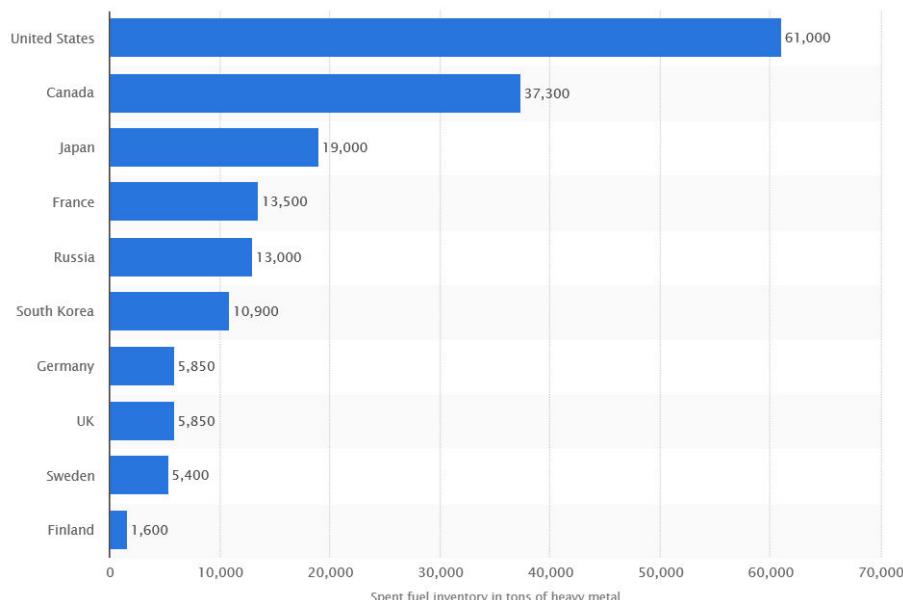
III. Definition of key terms:

- Nuclear Energy: It is the energy released during a nuclear reaction, especially by fission or fusion
- Fission: The splitting of a heavy nucleus which disperses energy
- Nuclear Energy Reactors: A structure where a controlled nuclear reaction takes place to release energy
- Ecosystem: a system involving the interactions between a community of living organisms in a particular area and its nonliving environment
- Fossil Fuels: Natural fuel such as coal or gas resulting from the remains of living organisms in the geological past. Living organisms that were fossilized.
- Radioactive Waste: Remains of the raw material used to produce nuclear energy, however is still radioactive and hazardous to human health
- Radiation: emission of energy as traveling electromagnetic wave or as moving subatomic particles, when those particles are of high energy they become dangerous. Several types of radiation that exist are dangerous to living organisms since they can penetrate skin and damage inner cells.

- Fission Fragments: The atomic fragments left after a large atomic nucleus undergoes nuclear fission.
- Greenhouse Gas Emissions: any of the array of different gases that contribute to the greenhouse effect

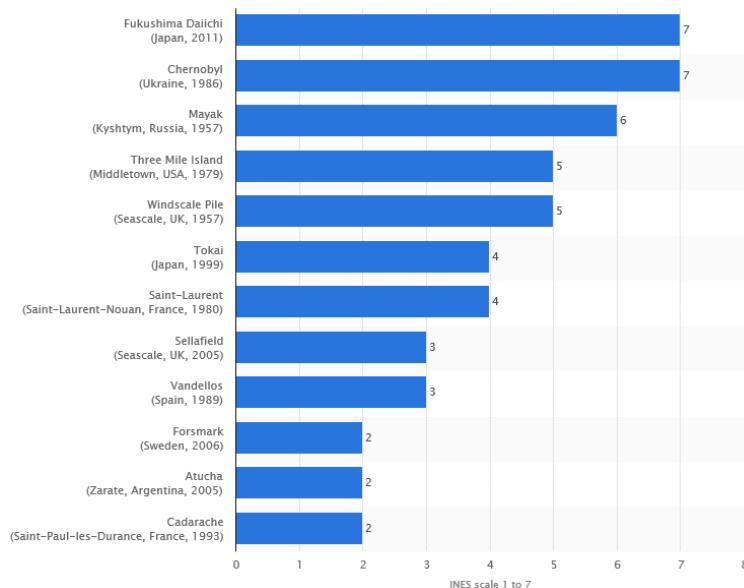
IV. Background information:

In order to further adhere to the worldwide existence of nuclear energy, here is an array of statistics to show its global presence through the years:

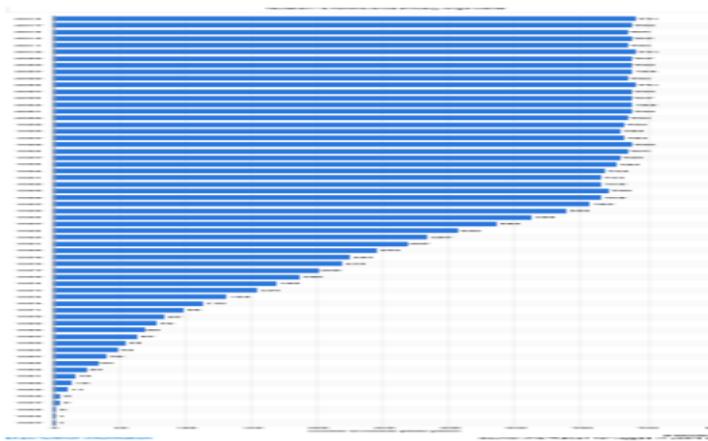


- This graph shows the amount of nuclear waste stored in several countries by the end of 2007, keeping in mind the date, the amount waste has of course gone up, but from the graph, the leading country in storing nuclear waste is apparent.
- The x axis shows the amount of nuclear waste by tons of heavy metal, for instance the United States, which is the leading country in storing nuclear waste shows that it contained 61 000 tons of heavy metal
- This heavy metal is stored and excluded from humankind since it is hazardous, and the amount stored is alarming seen as the use of nuclear energy has multiplied since then and the waste is also a lot more significant.

Nuclear Accidents Throughout the Years:

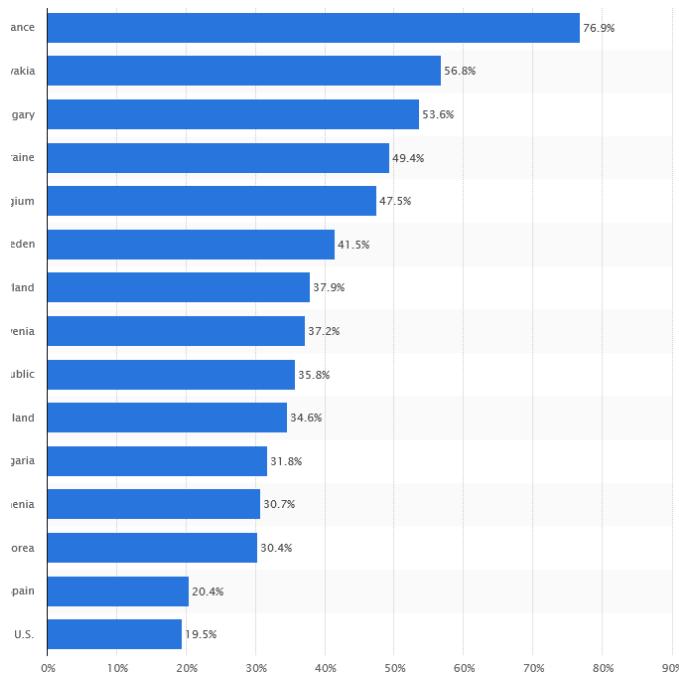


- If the graphic isn't clear you may consult:
<http://www.statista.com/statistics/273002/the-biggest-nuclear-accidents-worldwide-rated-by-ines-scale/> .
- They are rated from 1 to 7, one being least devastating and 7 being the highest threat



- Since it was too long the legend is not present. This shows the amount of nuclear power plants throughout the years starting from 1954 to 2015

- For specific numbers visit <http://www.statista.com/statistics/263945/number-of-nuclear-power-plants-worldwide/>



- Showing the percentage of national electricity produced by nuclear energy in several countries in 2014
- For clearer information consult <http://www.statista.com/statistics/270367/share-of-nuclear-power-in-the-power-supply-of-selected-countries/>

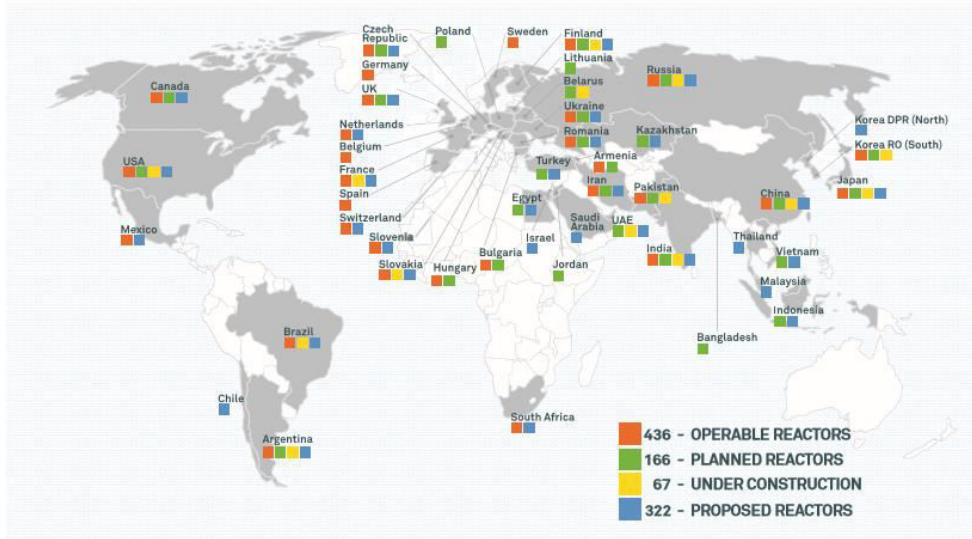
Sustainable development and Nuclear Energy:

Energy is the main link to all fields sustainable development wise; economically, environmentally, and socially. The main challenge of sustainable development through energy is finding a source that will be everlasting and be held on to until future generations. Nuclear energy fulfills that criterion by not spreading greenhouse gases in the atmosphere. However due to the existence of nuclear waste, this is debatable. Energy is essential to social stability by enhancing the standards of living seen as it gives access to new and different products, thus it has an input on the economic development and the prosperity of the countries that efficiently utilize it.

V. Major Countries and Organizations Involved:

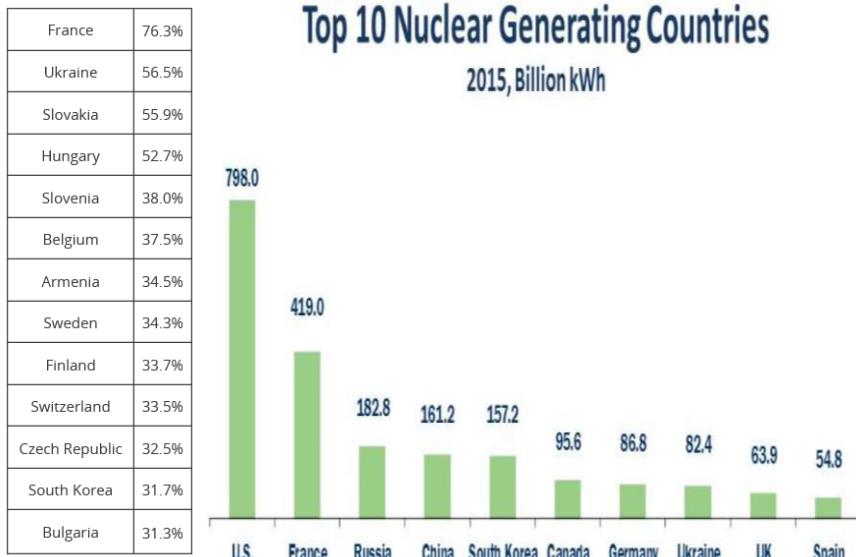
Countries involved:

How many power stations are there?



Top 10 Nuclear Generating Countries

2015, Billion kWh



1) United States of America:

Reaching 2015, The US benefited from nuclear energy to produce 19.5% of the country's power. Furthermore, it's the world's leading producer of nuclear power accounting more than 30% of worldwide nuclear generation of electricity.⁵

⁵ <http://www.nei.org/Knowledge-Center/Nuclear-Statistics/US-Nuclear-Power-Plants>

2) France:

France utilizes nuclear energy to produce 75% of the country's electricity. However due to a long-standing policy based on energy security, this share may fall down to 50% by 2025. Moreover, France uses the recycled nuclear fuel to produce 17% of its electricity that makes a total of 92% off of nuclear energy.⁶

3) China:

With 34 nuclear power reactors in operation, China is steadily moving its way to adapt nationally using nuclear energy, due to the air pollution resulting from coal-fired plants. 75% of China's electricity is derived from fossil fuels, thus an increasing amount of air pollution is present. Therefore, nuclear energy is an environmentally coherent solution

4) South Korea:

Nuclear energy provides 33% of the country's electricity; however it plans on increasing by 75% by 2029⁷. South Korea is currently running under treaty commitments with the USA, which constrains its fuel cycle options.

5) Germany:

Germany had 16 reactors forming 25 % of the country's electricity⁸. However, after the implementation of a policy to phase out nuclear energy in 2011, 8 reactors were immediately shut down, decreasing the percentage of electricity produced to 16%. Public opinion in Germany is opposed to nuclear energy with almost no support for building new ones.

6) Ukraine:

Ukraine has 15 reactors forming almost 50% of the country's electricity⁹. The country adopted no plans in diminishing the amount of nuclear power plants, and seeks to maintain the share of production till 2030, which will substantially increase the ease of access to

⁶ANONYMOUS, *Nuclear Power in France*. Available on: <http://www.world-nuclear.org/information-library/country-profiles/countries-a-f/france.aspx>, consulted the 29th of August 2016

⁷ ANONYMOUS, *Nuclear Power in South Korea*. Available on: <http://www.world-nuclear.org/information-library/country-profiles/countries-o-s/south-korea.aspx>, consulted the 29th of August 2016

⁸ ANONYMOUS, *Nuclear Power in Germany*. Available on: <http://www.world-nuclear.org/information-library/country-profiles/countries-g-n/germany.aspx>, consulted the 29th of August 2016

⁹ANONYMOUS, *Nuclear Power in Ukraine*. Available on: <http://www.world-nuclear.org/information-library/country-profiles/countries-t-z/ukraine.aspx>, consulted the 29th of August 2016.

electricity. During the past Ukraine received most of its nuclear fuel and services from Russia, however they are monotonously decreasing it by depending on other sources.

Organizations involved:

International Atomic Energy Agency (IAEA):

Known as the world's "Atoms for Peace" organization within the United Nations. It started in 1957 aiming to promote the safe, secure and peaceful use of nuclear technologies and the United Nation's Sustainable Development Goals.

Nuclear Energy Agency (NEA):

Formed on the first of February 1958. The mission of the NEA is to " assist its member countries in maintaining and further developing, through international cooperation, scientific, technological and legal bases required for the safe, environmentally friendly and economical use of nuclear energy for peaceful purposes"¹⁰. Some of the fields in which work the organisation are safety and regulation of nuclear activities, radioactive waste management, radiological protection and nuclear science.

World Association of Nuclear Operators (WANO):

Formed in 1989 following the Chernobyl disaster, WANO is dedicated to assess nuclear plants internationally and ensure nuclear safety. Some of the organisations commitment to insure safety in the field, are repeated reviews and they also send technical support missions to aid worldwide power plants.

World Nuclear Association (WNA):

Founded in 2001, WNA is an international organization that promotes nuclear power, also promoting wider public understanding of nuclear technology. Agneta Rising, the Director General of the organization was awarded the Swedish Nuclear Society Honorary prize due to her outstanding contributions to creating a fairer picture of the multi-faced

¹⁰ANONYMOUS, *OECD*. Available on: <http://www.oecd-nea.org/nea/>, consulted 5th of August 2016

nuclear aspects and thus contributed to the development of nuclear understanding and support world-wide.

VI. UN involvement:

The General Assembly adopted the resolution: (A/RES/32/50), on “Peaceful use of nuclear energy for economic and social development”

On 24th January 1946, Resolution 1 of the General Assembly declared the creation of the UNAEC in order to deal with the problems raised by the atomic energy discovery. However, it was disbanded in 1952, most probably due to its inactivity since 1949.

The International Atomic Energy Agency (already stated), is an organization established independently of the United Nations, seeking to promote the peaceful use of Nuclear Energy. However, it reports to both: the General Assembly and the Security Council.

In 2009 IAEA affiliating with the United Nations, began offering “Integrated Nuclear Infrastructure Review” (INIR) missions; in order to assess national developments in countries embarking upon nuclear power programs.

The IAEA has running missions and programs dealing with nuclear energy¹¹. Additionally, it has the initiative of addressing knowledge management, which aims to educate people about the process of nuclear energy production. Lastly the Convention of the Physical Protection of Nuclear Materials (CPPNM) is an instrument adopted in 1987 to protect and survey the international transportation of nuclear materials.

VII. Possible Solutions:

1. Pursuit of the use of renewable energy to reduce Nuclear Waste
2. Strengthening reactor security to lessen the possibility of Nuclear Disasters
3. Promote Nuclear Cycles, in order to benefit from a small percentage of the waste.
4. Suggesting detailed projects for the IAEA to adapt
5. Limit the size of nuclear reactors in order to limit the casualties in the event of a hazardous event

¹¹ The International fuel cycle facility

VIII. Guiding Questions:

1. What is your country's stance when it comes to the use and implementation of nuclear energy?
2. Has your country ever been victim to collateral damage originating from nuclear accidents?
3. What is your country's political, economic and environmental status?
4. Is your country involved in any national or international organizations concerning this issue?
5. What steps can the General Assembly take to address the problems that the ecosystem is facing when it comes to Nuclear Energy?
6. Is the far future more important than the present when it comes to importance? Or the opposite?
7. Is your country rich in Nuclear fuel resources?
8. How can the UN ensure the success of the resolutions adapted?
9. What makes your country's solutions applicable as well as sustainable and qualified?

IX. Useful links:

<http://www.world-nuclear.org/information-library/current-and-future-generation/nuclear-power-in-the-world-today.aspx>

<https://whatisnuclear.com/articles/nucenergy.html>

<http://www.nrc.gov/reading-rm/doc-collections/fact-sheets/radwaste.html>

<http://www.nei.org/Issues-Policy/Nuclear-Waste-Management>

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Anonymous, nuclear energy, available on :http://www.conserve-energy-future.com/Disadvantages_NuclearEnergy.php consulted 2/08/2016

Anonymous, Statistics and Facts about Nuclear Power Worldwide, available on: <http://www.statista.com/topics/1087/nuclear-power/> consulted 4/08/2016

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