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TECMUN Jr.

International Atomic Energy Agency

Outline of the International Atomic Energy Agency

The International Atomic Energy Agency, hereinafter referred to as IAEA, is an international body which responds to the General Assembly and the Security Council. Its main purpose is to regulate and promote the peaceful use of atomic power. The IAEA has the following three main functions: supervision of existing nuclear facilities to ensure a peaceful use, the following of the safety and security standards in each facility, and to work as a center for the science of nuclear technology and its peaceful applications. The IAEA also supervises the safeguards system, in which it can be verified the peaceful uses of nuclear materials.

Topic A

Procedures regarding the safe disposal of nuclear waste for the international community to follow in order to prevent new threats

By: Carlos Fernando Aguilar Molina

Committee's background

The International Atomic Energy Agency, hereinafter referred to as IAEA, is an international body which responds to the General Assembly and the Security Council. Its main purpose is to regulate and promote the peaceful use of atomic power. The IAEA has the following three main functions: supervision of existing nuclear facilities to ensure a peaceful use, the following of the safety and security standards in each facility, and to work as a center for the science of nuclear technology and its peaceful applications. The IAEA also supervises the safeguards system, in which it can be verified the peaceful uses of nuclear materials.

Background

Since the 1940s, the international community experienced a sudden interest in atomic energy. After World War II, nuclear energy in was seen as the best alternative to generate energy with fossil fuels. It was proved that a lot of energy was created in a short amount of time, so electricity would become cheaper. In 1954 the URSS built the first nuclear power plant in the world, bringing great advances to energy which later on contributed to the ecosystem, struggling economies, and the efficiency in resource management. It was in the 1970s when nuclear power reached its finest hour, in the days of the Yom Kippur war, when oil prices skyrocketed because of the embargo established by the Organization of the Petroleum Exporting Countries (OPEC) to the United States and its allies for their involvement in the war siding Israel. Even though the embargo was lifted a year later, nuclear power was given another opportunity.

Nuclear material, as mentioned before, has several peaceful applications which have the ability to contribute internationally to various communities. It is a reliable source of low-carbon energy which generates around 11% of the electricity around the world, making nuclear power one of the most important sources of energy. Since Nuclear Energy is a delicate source of power, it must have a meticulous system regarding its production in order to prevent failures and the misuse of nuclear materials. One of the most important and controversial procedures is the safe disposal of nuclear waste. Nuclear waste must be handled as the Joint Convention establishes. It is the first official legal instrument on the safety of spent fuel management and on the safety of radioactive waste management. Opened on on September 1997 by the IAEA.

There are around 444 nuclear reactors around the world, and 63 new nuclear plants which are under construction. The list of countries heading nuclear energy in the world is

growing apace every year. It now reduces to the following countries: France, Belgium, Czech Republic, Finland, Hungary, Slovakia, Sweden, Switzerland, Slovenia, Ukraine, South Korea, Bulgaria, USA, UK, Spain, and Romania. When nuclear power is consumed it produces waste (either solid, liquid or gaseous) this waste contains radionuclides, which are very unstable atoms that emit radiation. These conditions make the environment hazardous due to the high rate of radiation in Nuclear waste. By having a toxic environment the consequences can affect the vegetation, wildlife, agriculture products, and people exposed. The radiation exposure includes cancer and birth defects, among other abnormalities. Nuclear power is the source of energy that has to take the most responsibility for its waste, so it is of great importance to ensure its safe disposal.

The committee's job is to dictate the measures or alternatives the International Community must follow in order to tackle and prevent environmental pollution, ensure the safe disposal of Nuclear waste as long as it remains radioactive, and prevent the non-pacific use of the material. The committee must take into account all aspects of the waste disposal procedure. Since the material is officially considered as waste, the process itself, and all other potentials this material may have and the risks and considerations certain implementations would have.

Overview of countries with nuclear power development

The Chinese government plans to increase nuclear generating capacity to 58 GWe with 30 GWe more under construction by 2020. China has completed construction and commenced operation of 28 new nuclear power reactors over 2002-15, and some 24 new reactors are either under construction. Russia plans to increase its nuclear capacity to 30.5 GWe by 2020, using its world-class light water reactors. A large fast breeder unit has started up, the country's second, and development proceeds on others, aiming for significant exports. An initial floating power plant is under construction, with delivery due in 2017. Russia is active in building and financing new nuclear power plants in several countries. In the United States, there are five reactors under construction, four of them new AP1000 designs. One of the reasons for the hiatus in new build in the USA to date, is the extremely successful evolution in maintenance strategies. Over the last 15 years, changes have increased the utilization of US nuclear power plants. Argentina and Brazil both have commercial nuclear reactors generating electricity, and additional reactors are under construction. Chile has a research reactor in operation and has the infrastructure and intention to build commercial reactors. South Korea has four new reactors under construction and has placed orders for eight more. It is also involved in intense research

on future reactor designs. Bangladesh has contracted with Russia to build its first nuclear power plant. Pakistan with Chinese help is building three small reactors. Kazakhstan with its abundance of uranium is working closely with Russia in planning development of small new reactors for its own use and export. The United Arab Emirates is building four 1450 reactors at a cost of over $20 billion and is collaborating closely with IAEA and experienced international firms. Iran's first power reactor is in operation, and more are planned. Saudi Arabia, Jordan and Egypt are also moving towards employing nuclear energy for power and desalination. South Africa is committed to plans for 9600 Megawatts electric (MWe) of further nuclear power capacity. Nigeria has sought the support of the International Atomic Energy Agency to develop plans for two 1000 MWe reactors.

In September 2012 the International Atomic Energy Agency (IAEA) expected seven unknown newcomer countries to launch nuclear programs in the near term. Others had stepped back from the commitment because each needed more time to have the necessary infrastructure or did not have credible finances.

Environmental impacts from the nuclear industry

Within the different techniques of waste disposal there are some that have effects which can interfere and damage the environment.

Nuclear technology has polluted vast amounts of soil and water in many nuclear disposal facilities all over the world. Many of the substances released including plutonium, uranium and strontium remain hazardous for thousands of years. One of the biggest concerns are the effects in plants, animals and the environment. This can cause genetic variations in plants and animals or reduce the fertility of the soil. By recycling, the uranium can be reused producing benefits to the community. Certain long-lived radioactive elements, including plutonium, also can be processed to be used as fuel.

Waste Disposal

Each country has its own concerns and priorities. Many factors can define the disposal procedures each one uses. Two of the main methods of the disposal of Nuclear waste are Reprocessing and Direct Disposal. Direct Disposal consists in selecting a determined area to store nuclear waste. Typically a few meters underground, to prevent damage to local communities. Reprocessing is the most delicate of the two. Used Nuclear Fuel is not only radioactive, but also contains extremely poisonous elements like plutonium. The purpose of

reprocessing is extracting the plutonium from the remaining waste. Uses for the extracted plutonium are limited. For example, to build nuclear weapons, which is what the IAEA and the International Community is trying to avoid, or to recycle it and use it as new fuel. However, this is more difficult to happen, because not every reactor has the necessary technology. The incorrect use of the Reprocessing process is the source of new threats.

There are three main waste management practices:

- Direct disposal: This is the immediate storage of waste on the surface level, allowing its decomposition. And it is very common.
- Long-term disposal or geological repository states: Storage of nuclear waste at depths between 250m and 1000m.
- Reprocessing: A process in which the nuclear waste is recycled in order to create new advantages from its wastes instead of the storage methods. Also considered dangerous since the possibility to build a nuclear weapon from this state rises.

Country	**Method**
Belgium	Reprocessing
Canada	Direct disposal
China	Reprocessing
Finland	Direct disposal
France	Reprocessing
Germany	Reprocessing
India	Reprocessing
Japan	Reprocessing
Russia	Reprocessing
South Korea	Direct disposal
Spain	Direct disposal
Sweden	Reprocessing

Switzerland	Reprocessing
United Kingdom	Reprocessing
United States of America	Direct disposal

(n.d.). Retrieved July 03, 2016, from http://www.world-nuclear.org/information-library/nuclear-fuel-cycle/nuclear-wastes/radioactive-waste-management.aspx

There is also another option that has appeared and has been mentioned in different discussions, Pangea. It is the implementation of a multinational geological repository. There are some advantages in this project, for example the environmental protection, nuclear safety as well as the nuclear non-proliferation.

Transportation of nuclear waste

There are about 20 million shipments of radioactive material transported all around the world annually. The IAEA have been publishing the regulations of transport of radioactive material. There are specific regulations to follow in each shipment. These depend on the distance, the volume that is being transported, etc. The security of the material chiefly depends on the package. This is why there are strict standards for it. Based on different categories, the standards provide and set the criteria for each design considering the physical form and the activity of the material. A study of Euratom Supply Agency in 2015 detected lack of coordination and over-regulation in the authorization of the transport of Nuclear materials in general, meaning a very serious risk regarding international safeness of purveyance.

Since 1971, there have been around 7000 shipments that transported used fuel around the world. Also, despite the technological advances and the experience of different nations accidents that have happened. From 1971 to 1996, there has been over 58 accidents and incidents during the transportation of the nuclear waste in the United States only.

New Threats

There are three types of Nuclear waste. These are:

- Low-level waste (LLW). It is harmful enough for people, it is not always required storage or shielding in handling because of its low levels of radioactivity though.
- Intermediate-level waste (ILW). For this kind of Nuclear waste it is necessary a shielding process and more sophisticated measures.

- High-level waste (HLW). It requires shielding and also cooling because of its high temperatures.

All HLW is kept in safe nuclear facilities with appropriate security standards in order to avoid any unauthorized access. Security around the pools that refrigerate HLW is apparently so safe that some countries think that the possibility of the creation of a "dirty bomb" is impossible, although, there have been made many suggestions to the US Nuclear Commission (NRC) asking for new safe protocols in order to protect the HLW from unauthorized access affirming the following: "Nuclear power reactor spent fuel pools are neither easily reached or easily breached. Instead, they are strong structures constructed of very thick steel-reinforced concrete walls with stainless steel liners. In addition, other design characteristics of these pools, not analyzed in the paper, can make them highly resistant to damage and can ease the ability to cope with any damage. Such characteristics can include having the fuel in the pool partially or completely below grade and having the pool shielded by other plant structures." - NRC.

The nuclear technology expert at the Institute of Policy Studies and former of the Energy Department, Robert Alvarez, said that if any of the pools suffers any damage caused from a terrorist group or the implementation of a "Dirty Bomb" can cause a "Catastrophic fire" which could be "worse than a reactor meltdown."

Nuclear waste is always threatened by a possible accident of any kind towards its facilities. In order to prevent any serious consequences, there are various procedures ready to be simplemente if there is a need. This plan is the IAEA Action Plan on Nuclear Safety and it is divided into twelve actions:

1. Safety assessments in light of the Fukushima accident.
2. IAEA peer reviews.
3. Emergency preparedness and response.
4. National regulatory bodies.
5. Operating organizations.
6. IAEA Safety Standards.
7. International legal framework.
8. Member states planning to embark on a nuclear power programme.
9. Capacity building.
10. Protection of people and the environment from ionizing radiation.
11. Communication and information dissemination.
12. Research and development.

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Glossary

A

Actinide.- An element with atomic number of 89. Actinides are radioactive and typically have long half-lives. They are therefore significant in nuclear wastes.

E

Electricity.- Electric current used or regarded as a source of power.

Embargo.- An order of a government prohibiting the movement of merchant ships into or out of its ports.

Environment.- the aggregate of surrounding things, conditions, or influences; surroundings; milieu.

D

Desalination.- Removal of salt (sodium chloride) and other minerals from the sea water to make it suitable for human consumption and/or industrial use.

F

Fission.- The splitting of a heavy nucleus into two, accompanied by the release of a relatively large amount of energy and usually one or more neutrons

Fossil fuel.- A fuel based on carbon presumed to be originally from living matter (coil, oil, gas).

H

Hazard: a danger or risk.

Heavy water.- Water containing an elevated concentration of molecules with ("heavy hydrogen") atoms.

Heavy water reactor (HWR).- A reactor which uses heavy

High-level wastes (HLW).- Extremely radioactive fission products and transuranic elements (usually other than plutonium) in used nuclear fuel. They may be separated by reprocessing the used fuel, or the spent fuel containing those isotopes may be regarded as high-level waste. HLW requires both shielding and cooling.

I

Isotope.- An atomic form of an element having a particular number of neutrons. Different isotopes of an element have the same number of protons but different numbers of neutrons.

L

Light water reactor (LWR).- A common nuclear reactor cooled and usually moderated by ordinary water.

Low-level wastes.- Mildly radioactive material usually disposed of by incineration and burial.

M

Megawatt (MW): A unit of power, one million of watts. MWe refers to electric output from a generator, MWt to thermal output from a reactor or heat source.

N

Neutron.- An uncharged elementary particle found in the nucleus of every atom except hydrogen.

Nuclear power.- A form of energy produced by an atomic reaction, capable of producing electrical power.

Nuclear reactor.- device in which a nuclear chain reaction occurs under controlled conditions.

P

Plutonium: The chemical element of atomic number 94, a dense silvery radioactive metal of the actinide series, used as a fuel in nuclear reactors and as an explosive in nuclear fission weapons.

R

Radiation.- The emission and propagation of energy by means of electromagnetic waves or particles.

Radioactivity: the emission of ionizing radiation or particles caused by the spontaneous disintegration of atomic nuclei.

Radionuclide.- A radioactive isotope of an element.

Radiotoxicity.- The adverse health effect of a radionuclide due to its radioactivity.

Repository: A permanent disposal place for radioactive waste.

S

Shielding.- A protective device or structure.

U

Uranium: the chemical element of atomic number 92, a gray, dense radioactive material used as fuel in atomic reactors.

W

Waste Disposal: Removing and destroying or storing damaged, used or other unwanted domestic, agricultural or industrial products or substances.

Topic B

The implementation of nuclear energy as a beneficent application in food and agriculture in order to improve human development needs observed within the Member States

By: Carlos Fernando Aguilar Molina

Food Irradiation

Since it was discovered that Nuclear Energy had several applications that contribute as a positive alternative to tackle different obstacles that exist today, deep investigations regarding its capacities in various categories began. One in particular is considered a great advance in technology when it comes to food quality, food irradiation. This is a method that employs a particular form of electromagnetic energy, which comes from ionizing radiation. This procedure produces electrically charged particles or ions. The most important fact in the use of this method is the fact that during its execution it kills bacteria.

This system provides food with great resistance to deterioration due to the lack of bacteria. There are several obstacles that food irradiation has in order to become a large participant in all food producing companies. There are problems like the consumer misconception, the infrastructure needed, the price this process represents, and others. It is imperative to determine the advantages and disadvantages in order to come up with a decision of its implementation or if it is to be discarded.

Death by food intoxication is one of the principal problems that countries that live in extreme poverty face. They do not have direct access to high quality food because of its current situation. This forces them to conform with the low quality food. By eating food in terrible conditions it is very common to receive food which has no health of quality product standards, that is already putrefaction process. The bacteria they will ingest, will cause them serious diseases that will most likely affect their health permanently or even cause death. Also, the death rate increases in these situation due to their need for medication which is out of reach.

Consumer Misconceptions

One of the most concerning obstacles of peaceful Nuclear applications in food and agriculture is the consumer misconceptions. People all around the world are not aware of the status of Nuclear Energy. Most of the time they hear Nuclear or radioactive they link the idea to weaponry and disease.

Regarding food and agriculture, Nuclear Energy has various applications which are beneficent to society. One of the main obstacles of IAEA is to change the concept of Nuclear energy. And specifically in food, nuclear is not very popular. These misconceptions are many, nuclear energy applied in food can be unhealthy and can cause an illness. In order for the large companies to earn more money, they modify food making it cheaper, and less natural. Food

loses its nutritional values when it´s processed by Irradiation. These examples are many, and most are only misunderstandings and confusion between other products and procedures.

The difficulty with consumer misconception is that Irradiation does affect food. It does modifies its nutritional values. But these effects are minuscule, and will not affect a person's diet in any negative way. The other side is positive, because it is convenient to make food last longer without losing its properties. To eliminate harmful bacteria in order to offer higher quality food to a cheaper price and affect positively international food infections and disease.

It is very important to change all Nuclear energy misconceptions, but specially the ones related to food and agriculture. It is a narrower target, but there are several obstacles to overcome. To reduce consumer misconceptions is a matter of great importance if the IAEA is to introduce newer, better, and cheaper sources of food, and improve low-quality products and services.

Can all countries afford Non-Power Nuclear technologies?

One of the big challenges that developing countries (interested in Nuclear energy) face, is the payment of the liability amounts for which they would be responsible under any of the specification conventions, especially the revised Paris Convention or the Convention on Supplementary Compensation. The amounts settled in The Paris Convention of 1963 are: $450 million just for liability. In the event of a major accident, these nations might fall in a security and economic crisis. The list of countries that has no nuclear technologies have an average GDP of 453 thousands of millions USD, meanwhile the list of countries heading the nuclear race has an average GDP of: 3,888 billions of USD. A huge difference that represents an uncertain future for developing countries in the nuclear technologies.

List of countries with the best Nuclear energy development:

● Canada	● Germany	● Russia
● China	● Japan	● Ukraine
● France	● Korea RO	● USA

List of countries that have nuclear technologies:

• Argentina	• Czech Republic	• Netherlands	• Spain
• Armenia	• Finland	• Pakistan	• Sweden
• Belgium	• Hungary	• Romania	• Switzerland
• Brazil	• India	• Slovakia	• United Kingdom
• Bulgaria	• Mexico	• South Africa	

List of countries planning to start using nuclear energies (based on previous statements in name of the specific countries indicating the planification in process):

• Belarus (GDP 72 millions)	• Poland (GDP 525 millions)	• UAE (GDP 402 millions)
• Iran (GDP 368 millions)	• Slovenia (GDP 48 millions)	
• Lithuania (GDP 45 millions)	• Turkey (GDP 822 millions)	

List of countries interested in nuclear technologies (which have stated its interest on Nuclear energy):

• Bangladesh (GDP 150 thousands of millions)	• Israel (GDP 290 thousands of millions)	• Korea DPR (GDP 12 thousands of millions)	• Vietnam (GDP 171 thousands of millions)

• Chile (GDP 277 thousands of millions)	• Italy (GDP 2140 thousands of millions)	• Malaysia (GDP 313 thousands of millions)	
• Egypt (GDP 272 thousands of millions)	• Jordan (GDP 33 thousands of millions)	• Saudi Arabia (GDP thousands of 748 millions)	
• Indonesia (GDP 868 thousands of millions)	• Kazakhstan (GDP 232 thousands of millions)	• Thailand (GDP 387 thousands of millions)	

Average: 453 thousands of millions USD

*quantities in USD

There are several advantages that come with nuclear energy such as:

• Nuclear-generated electricity contributes in reducing gas emissions and could therefore help in solving global warming problems.	• Disease-causing microorganisms are reduced or eliminated in food.	• The use of pesticides is considerably reduced.

• Can change genetically the seeds and crops in order to make them better.	• Nuclear energy can contribute to energy security, reducing or eliminating the need for natural gas or other fossil fuels now used frequently for electricity generation.	• A bigger amount of energy is produced using nuclear technologies.

There is considerable confusion regarding nuclear energy internationally. Nuclear power has been constantly creating deep confusion among international society. Concerns about safety have arisen since the Fukushima Daiichi nuclear disaster in Japan. Also, the technology has proven to be expensive: its high capital costs, combined with restructured electricity markets, and the absence of a serious commitment to greenhouse gas emissions reduction, make nuclear power uncompetitive in many markets. Specially in the developing countries. The four new reactors being built in the United States today are a clear prove of the reduced number of money invested nowadays in nuclear energy.

Nevertheless, seventy nuclear reactors are under construction worldwide. Twenty-seven of those are in China, ten are in Russia, and six are in India. These new reactors are dominating today's market, producing 75% of the electricity in France, 20% in the United States, 18% in the United Kingdom, and 17% in Germany. Germany, once a leader in advanced reactor designs, closed its reactor development laboratories some years ago, ending all research. However, China, India, Korea, and Russia continue to support vigorous development and demonstration programs.

Almost all developed countries emphasize in the effort needed to empower their nuclear energy systems, they are expecting to see a resurgence of support for nuclear power (presumably using safer and lower-cost technologies). In the meantime, the rest of the world will continue its building initiative and push on with the development of new designs. Small

modular reactors may be attractive in many developing nations such as (South Africa, Brazil, Mexico, Colombia, Taiwan, Niger, Colombia, Panama, Côte d'Ivoire, Ukraine)

Irradiation on a Global Scale

Food irradiation for sprout inhibition, disinfestation, and disinfection has been implemented in many countries. Since 1984 the basis of food irradiation were stated and published by the International Consultative Group on Food Irradiation (ICGFI), which was established by the FAO, IAEA and the WHO.

Food irradiation is a technique used around the world, day by day grows. Investigations demonstrated that the quantity of irradiated foods in the world were 405,000 tons (100%). 186,000 tons (46% of the total) for disinfection of spices and dry vegetables, 82,000 ton (20% of the total) for disinfestation of grains and fruits, 32,000 ton (8% of the total) for disinfection of meat and fish, 88,000 ton (22% of the total) for sprout inhibition of garlic and potato, and 17,000 ton (4% of the total) of other food items that included health foods, mushroom, honey, etc. Commercial food irradiation is increasing significantly in Asia, but decreasing in the EU due to the uncertainty of this technique and its high costs.

Quantity of irradiated foods in Asia.

Country	Quantity (tons)		Items
	2005	2010	
China	146,000	>200,000	Garlic, Spices, Grain, Meat, Health foods, Others
India*	1,600	2,100	Spices, Dried vegetables, Fruits
Indonesia	4,011	6,923	Cocoa, Frozen sea foods, Spices, Others
Japan	8,096	6,246	Potato
Korea	5,394	300	Dried vegetables
Malaysia	482	785	Spices, Herbs, Others

Pakistan		940	Pulses, Dries vegetables
Philippines	326	445	Spices, Dries vegetables
Thailand	3,000	1,484*	Fruits, Others
Vietnam	14,200	66,000	Frozen sea foods, Fruits, Others
Total	183,109	285,223	

*Not include the private sectors

Quantity of irradiated foods in the EU.

Country	Quantity (tons)		
	2005	2010	
Belgium	7,279	5,840	Frog legs, Poultry, Herbs and spices, Dehydrated blood, Fish and shellfish, Meat, Others
Czech	85	27	Dried aromatic herbs, spices and vegetable seasoning
Germany	472	127	Dried aromatic herbs, spices and vegetable seasoning
Spain		369	Dried aromatic herbs, spices and vegetable seasoning
Estonia		10	Dried aromatic herbs, spices and vegetable seasoning
France	3,111	1,024	Frozen frog, Poultry, Gum Arabic, Herbs, spices and dried vegetables
Netherlands	3,299	1,539	Dehydrated vegetables, Frog parts, Spices/Herbs, Egg white, Poultry meat (frozen), Shrimps (frozen), Others
Hungary	111	151	Herbs and spices, spices and vegetable seasoning
Poland	687	160	Dried aromatic herbs, spices and vegetable seasoning
Romania		17	Dried aromatic herbs
Total	15,044	9,264	

Quantity of irradiated foods in the US.

	Quantity (tons)	
	2005	2010
Disinfection of spices	80,000	80,000
Disinfestation of grains and fruits	4,000	15,000
Disinfection of meat	8,000	8,000
Total	92,000	103,000

Table 6. Quantity of irradiated agricultural products for phytosanitary in 2010.

	Quantity (tons)	Items
Hawaii	5,734	Papaya (12 tons), Tropical exotics[a] (260 tons), Sweet potatoes (5,370tons)
Australia*	493	Mango (460 tons), Litchi (33 tons), Litchi (18 tons), Rambutan (8 tons)
India	100	Mango
Thailand	951	Longan (595 tons), Mangosteen (330), Litchi (18 tons), Rambutan (8 tons)
Vietnam	850	Dragon fruit
Mexico	10,318	Guava (9,121 tons), Sweet lime (600 tons), Mango (239 tons), Grapefruit (101 tons), Manzano pepper (257 tons)
Total	18,446	

[a] Longan, dragon fruit, rambutan , mango, mangosteen

*Exported to New Zealand.

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Glossary

A

Agriculture: The science, art, or occupation concerned with cultivating land, raising crops, and feeding, breeding, and raising livestock; farming.

B

Bed nets: Netting which is hung over the bed to keep out mosquitoes and other insects.

Bacteria: ubiquitous one-celled organisms, spherical, spiral, or rod-shaped and appearing singly or in chains, comprising the Schizomycota, a phylum of the kingdom Monera, various species of which are involved in fermentation, putrefaction, infectious diseases, or nitrogen fixation.

D

Dengue: an acute, infectious tropical disease caused by a flavivirus transmitted by mosquitoes, and characterized by high fever,rash, headache, and severe muscle and joint pain.

E

Electricity market: a system enabling purchases, through bids to buy; sales, through offers to sell; and short-term trades, generally in the form of financial or obligation swaps. Bids and offers use supply and demand principles to set the price.

F

Food Irradiation: is the process of exposing food to a controlled amount of energy called "ionizing radiation". There are three types of radiation allowed: Gamma Rays, X-Rays and electron beam radiation.

Fukushima Daiichi Accident: the Fukushima Daiichi nuclear disaster was an energy accident at the Fukishima I Nuclear Power Plant in Fukishima, Japan, initiated primarily by the tsunami caused by the Japan earthquake of March 2011.

G

GDP: Gross domestic product is the monetary value of all the finished goods and services produced within a country's borders in a specific time period.

H

HIV/AIDS: HIV stands for human immunodeficiency virus. If left untreated, HIV can lead to the disease AIDS (acquired immunodeficiency syndrome). HIV attacks the body's immune system (T cells). Over time, HIV can destroy so many of these cells that the body can't fight off infections and disease. These opportunistic infections or cancers take advantage of a very weak immune system and signal that the person has AIDS, the last state of HIV infection.

L

Liability: the responsibility of a person, business or organization to pay or give up something of value.

M

Malaria: an intermittent and remittent fever caused by a protozoan parasite that invades the red blood cells. The parasite is transmitted by mosquitoes in many tropical and subtropical regions.

Misconception: an idea that is wrong because it is based on a failure to understand a situation.

Modular reactor: nuclear power plants that are smaller in size than current generation base load plants.

N

Nuclear arms race: The nuclear arms race was central to the Cold War. Many feared where the Cold War was going with the belief that the more nuclear weapons you had, the more powerful you were.

Nuclear reactor: a device in which nuclear fission initiates a controlled chain reaction, producing heat energy typically used for power generation, and neutrons and fission products often used for military, experimental, and medical purposes.

P

Paris Convention: the Paris Convention was signed on the 20th of March 1883. It was one of the first intellectual property treaties. It established a Union for the protection of industrial property. The convention is currently still in force.

P. *falciparum*: it is a parasite found worldwide in tropical and subtropical areas, especially in Africa where this species predominates.

Plague: an unusually large number of insects or animals infesting a place and causing damage.

Poultry: birds, such as chickens, kept for their eggs or meat.

P. *vivax*: a parasite mostly found in Asia, Latin America and some parts of Africa. Because of the population densities especially in Asia, it is the most prevalent human malaria parasite. It has dormant liver stages that can activate and invade the blood several months or years after the mosquito bite.

R

Raw food: any uncooked, unprocessed, and often organic foods, esp. as eaten as a large percentage of the diet

Resurgence: an increase of activity or interest in a particular subject or idea which had been forgotten for some time.

S

SIT: a method of pest control using area-wide inundative releases of sterile insects to reduce reproduction in a field population of the same species.

Sprout: to begin to grow, or to produce new growth.

Sustainable: pertaining to a system that maintains its own viability by using techniques that allow for continual reuse

W

Weaponry: weapons in general.