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LET PEACE BE OUR QUEST/2015

STUDY GUIDE

INTERNATIONAL ATOMIC ENERGY AGENCY:

TOPIC B: THE USE OF ATOMIC ENERGY AS A SOURCE OF ELECTRICAL POWER

UNIVERSIDADE FEDERAL DE PELOTAS

RS-BRASIL

Letter from the Chair

Distinguished Delegates,

It is our utmost pleasure to welcome you as part of the PelotasMUN IAEA committee. You are about to take part in an event which will lead you to high level debate of one of the main topics of the United Nations. As the chairs, we carefully chose the issues to be discussed in order to provide good flow of debate and learning for our nation's representatives.

We believe that having your committee assignment you are entitled to start preparation by readying this study guide. The Chair highly recommends you to pay attention on this document for further preparation in order to keep the quality level of debate. By the time you are aware of your country representation, you should move to research about your nation's position in IAEA, in relation to other nations and before the topics. Then it is time for preparing you position paper.

Please, do not hesitate to contact us in case of doubts and trouble during your preparation.

We are very much looking forward to PelotasMUN and working with you!

Warm Regards,

Leonardo Agrello Madruga, Maira Aoki & Wagner Roveder

IAEA Directors.

A brief historic of the International Atomic Energy Agency

The growing preoccupation with the dissemination of the technic of nuclear power and the possibility of its use in military purposes was part of the discussion of the newly formed United Nations (UN). So in December of 1945, it was formed the Commission of United Nations, with the scope of discuss the matters that emerged from the discovery of the atomic energy. The Baruch Plan, that was one of the proposals from United States, sought to create an organ that would control the activities potentially dangerous to humanity, besides having the duty of storing information of the sources of uranium and thorium. But the Soviet Plan was to destroy all of the arsenals, and, then, enforce a convention with the purpose of disarmament. The commission ended its work in 1952, without managing a solution for the matter.

The International Atomic Energy Agency (IAEA) is the central worldwide organism for nuclear matters. The Agency was created in response for the fears that the nuclear energy could cause, may it be for good (in the production of electric energy and other peaceful uses), or for harm (in the production of nuclear weapons). The IAEA started its activities with "Atoms for Peace", introduced to the General Assembly of United Nations by the president of United States, Dwight D. Eisenhower. The proposal presented had as its aim the creation of an agency with the purpose of the promotion of the use of nuclear energy for the good for human kind, acting as a "bank" of nuclear material.

Ergo, based in the proposal from United States, it was held the first Geneva Summit, in August of 1955, to discuss the pacific uses of nuclear energy, counting with the participation of about 1500 delegates including scientists and engineers from several nationalities.

Those events gave the push needed for the development of the Statute of IAEA for a certain group of countries which started to converse about the terms that the agency would function. The Statute of the Agency was approved in 1956, by 81 countries, shaping the functions of the Agency. IAEA's mission has interests

of the States members and the strategic plans and principles within the Statute. Thus, IAEA have three pillars of operation, such as: Safety, Science and Technology, Safeguard and Verification. IAEA's relationship with UN occurs by an especial agreement, in which is compost by the terms of its own Statute. The agency gives annual reports to the General Assembly of UN, to the Economic and Social Council (ECOSOC), and when necessary, also to the Security Council of UN about peace and international security.

In their first years of operation, the Agency had been through troublesome times, faced tough political e technical problems for its low appreciation on Statute formation, and for the Cuban missiles it created a crisis, at the time, for the leading figures of great powers, Soviet Union and United States, with the desire of the control of the nuclear technologies. Adding, the ascension of China and France as owners of nuclear weapons it was created the necessity in the countries of forming treaties of non-proliferation of these weapons. So in 1968, was established the T*reaty of Nonproliferation of Nuclear Weapons* (NPT), that counted with the presence of key-countries and the main countries in development.

Besides the problems of non-proliferation, the Agency would also deal with several mishaps in its operations as later accidents and breach of safeguards that indicated the need of constant improvement. In the 90s, it was discovered several illegal nuclear programs in some countries in the Middle East, in addition to breaches in agreements of safeguards by the Democratic Republic of Korea. Moreover, the nuclear accidents in Three Mile Island in 1979 and Chernobyl in 1986 draw international attention to the need of reinforcement in the matter of world safety in the nuclear procedures.

The IAEA Secretariat is headquartered at the Vienna International Centre in Vienna, Austria. Operational liaison and regional offices are located in Geneva, New York, Toronto and Tokyo. The IAEA Secretariat is a team of about 2500 multidisciplinary professional and support staff from more than 100 countries. Currently, the Agency has 162 members, with the recently adherence of Rwanda (2012), Bahamas (2014), and Guyana (2015). The agency is presently coordinated by the Director General Yukiya Amano, and seven more directors are in charge of the major departments of the organization: Department of Nuclear Science and Applications, Department of Nuclear Energy, Department of Nuclear

Safety, Department of Safeguards and Technical cooperation.

IAEA is currently financed by regular budgets and voluntary contributions. The annual budget is given by the General Conference, the extra funds and the voluntary contributions are sent to Fund of Technical cooperation. According with its Statute, the Agency has the right of encourage and support researches for the use of atomic energy with pacific purposes, providing materials, services and equipment, all within the Statute, for the production of Atomic Energy. As well, is also its role encouraging the exchange of experts in nuclear energy.

Lastly, the agency has the right to supervise nuclear materials to ensure that they are not used with military purposes, making inspections and accounting the nuclear materials for the development of nuclear energy. The agency will try to accelerate and expand the contribution of atomic energy for peace, health and prosperity for the world. Will assure, as much as possible, that the assistance provided by the agency or supervision must not be used with military purposes.

Structure of IAEA:

In general, the Agency is composed by two organs: The General Conference, major organ, and the Board of Governors, organ that takes the major decisions, are principally the ones that concern the safeguards. The General-Director supported by his/her secretariat, manage the international organism together with the others departments that implement the plans of actions.

General Conference:

The General Conference is composed by all the countries members of the Agency and they have meetings annually, happening usually on September. The exceptional meetings are called in by the General-Director, upon request of the Board of Governors or the majority of its members. Each State member is represented by a delegate, he/she may bring a surrogate or a counselor. The Conference has the capability of discussing all of subjects possible that are within their constitutive act. It is the duty of the General Conference appoint member of the Board of Governors, approve new members, suspend privileges of members, approve budgets, as well as approve the nomination of the General-Director of the agency.

Board of Governors:

The Board of Governors is composed by 35 members. They are chosen by the article 6 of its Act Constitutive, with the mandate of one year. They have meetings five times a year, but exceptional meetings can be called if deemed necessary. The Board of Governors can perform the functions of IAEA, excluding the responsibilities of the General Conference, also nominates the General-Director, elaborates the annual report with the projects approved by IAEA, approves agreements of safeguards, publishes norms of safety and analyze requests of membership.

General-Director:

In the Article 7 of the Act Constitutive of IAEA, the General-Director is the main chief of the agency, the highest post within the organization. The General-Director is nominated by the Board of Governors, with the approval of the General Conference, for a mandate of four years. It is upon the General-Director the decision of recruitment, organization and direction of people strategy. Since 2009, the post of General-Director is being exercised by Yukiya Amano, who is advised by the Office of Legal Affairs, by the Secretariat of Policies and the Office of Auditing. The others departments of IAEA are subordinated to the General-Director.

An historical overview on the development of the nuclear energy

The knowledge about radioactivity is not a so recent factor for science. According to the World Nuclear Association, the Uranium has been discovered by a German chemist, Martin Klaproth, in 1789. After that, the next remarkable fact occurred at the end of the XIX century. It was the discovery of the X-Ray by Wilhelm Rontgen, in 1895. Rontgen's feat inaugurated a series of discoveries in the field of chemistry and consequently about the nuclear energy.

Already on XX century, and with the entrance of a new period of wars, it was the World War II, also known as the Second Great War, the trigger for one of the most important discovery regarding to the nuclear energy and which would

have drastic consequences years before. On 6th January 1939, Otto Hahn and Fritz Strassman publicized in the journal *Naturwissenschaften* the results of their researches. They had split uranium atom into two or more lighter elements, by bombarding it. Fission had been discovered (FISCHER, 1997).

From that, scientists also noted that energy probably would be released from such reaction, the energy that used to keep the uranium's nucleus bound. In the same year, in France, four scientists, two of them refugees, took out patents for the both potential application of nuclear energy, civilian and military. The aspirations brought by the war, therefore, boosted the discovering of nuclear explosives, which had its capacity sadly seen with the explosions in Hiroshima and Nagasaki years later, and also the peaceful utilities, like as a source of energy.

Due to the mentioned terrible events, as the same time of the growing development on nuclear matter by the other countries, United States itself realized the importance and proportion that this issue would demand globally. David Fischer, in "History of the International Atomic Energy Agency", comments that in September of 1953 appears to emerge the idea of what would be the kernel of American president's Dwight D. Eisenhower.

The former president of United States of America started to think about the possibility of reuniting the fissile materials of the nuclear weapon States in order to use it for peaceful purposes, benefiting all nations through the creation of an international agency. That would be the basis of his speech in December of 1953, presented to the United Nations' General Assembly, received with applause.

In his words:

> The more important responsibility of this atomic energy agency would be to devise methods whereby this fissionable material would be allocated to serve the peaceful pursuits of mankind. Experts would be mobilized to apply atomic energy to the needs of agriculture, medicine and other peaceful activities. A special purpose would be to provide abundant electrical energy in the power-starved areas of the world (EISENHOWER, 1953).

In December of the following year, the International Atomic Energy Agency was created. This came to be a landmark for the peaceful uses of the nuclear energy around the world.

The atomic energy as a source of electrical power

Primarily, it is worth to say that the peaceful uses of nuclear energy are not restricted of its use as a source of electrical power. The different areas that are treated by the International Atomic Energy Agency, concerning the peaceful use of atomic energy, are: Cancer Care and Control, Nuclear Power, Peaceful Uses Initiative, Water Resources and Marine Environment, Addressing Climate Change, Food Security and Agriculture, Human Health and Nutrition, Animal Health and Production.

The first nuclear power plant was inaugurated in 1954, in the former Soviet Union. Its origins date from years before, when URSS was running after creation of new ones as well as the development of its existing reactors. In June of that year, the world's first nuclear powered electricity generator began operation in the city of Obninsk, the “AM-1”. According to the World Nuclear Association, the AM-1 produced electricity until 1959. After that, it was converted into a research facility centre, which was finally closed on the 2000s.

Similar to the AM-1 was the reactor situated in Chernobyl, the Chernobyl-type RBMK (*reaktor bolshoy moshchnosty kanalny* - in English, High Power Channel Reactor), for which served as a prototype. Chernobyl Nuclear Power Plant is placed in Ukrainian territory, former part of Soviet Union. It was the epicentre of the worst nuclear accident in terms of costs and consequences.

The plant started to produce power in 1977, and the fourth reactor unit entered into operation in 1983. The last reactor put in operation, Unit 4, would come to be the kernel of the Chernobyl’s disaster. In the first hours of April 26th of April 1986, an accidental explosion destroyed the core of that unit. The powerful fire generated by the explosion lasted for ten days, promoting the release of a massive amount of radioactive material on the environment.

Particles released were allocated in the soil, vegetation, buildings, machinery, etc. and were also carried for other regions, due to the showery weather on the western part of Soviet Union those days. According to the report “The Human Consequences of the Chernobyl Accident”, of the United Nations Development Program (UNDP), the material carried by the wind fell out over areas of Belarus, Russia, Ukraine and beyond (UNDP, 2002).

As stated by the International Chernobyl Research Information project, giving an overview about the costs of the disaster, an emergency and recovery operation involved 350.000 workers. The operation was set up in order to contain and clean up the accident between 1986 and 1987. Concerning to the number people living in areas considered as ‘contaminated’, it is estimated in more than five million, and 400.000 of them living on the areas of “strict control radiation”. The presented data gives us an idea of the amplitude of the disaster.

The first United States’ reactor was put in operation in 1957. It was built from the first constructed Pressurized Water Reactor (PWR) for naval use, in Idaho, USA. It was named as ‘Mark 1’ reactor. This reactor led to the Atomic Energy Commission to build up the Shipping Port Atomic Power Station. It functioned until 1982 and begun to be dismantled three years later.

Besides its successful experiences with atomic energy, the United States, similarly to the former URSS, also faced a grave accident with a nuclear plant. The accident happened in the Three Mile Island nuclear power plant, Pennsylvania – USA. It had two pressurized water reactors, with the accident having been originated on the Unit 2.

The event occurred on 28 March 1979, when a cooling malfunction made part of the core to melt, provoking the release of some radioactive gas a couple of days after the accident. Differently of what would occur in Chernobyl years later, the radiation was not enough to the point of causing health effects in the local residents, as well as did not have injured people involved (World Nuclear Association, 2012).

Expansion on the use of nuclear power

In early 1960s, the first fully commercial nuclear plant was designed in United States by Westinghouse Electric Corporation. Later in the same year, besides of pressurized water reactors (PWR), also have been developed the boiling water reactor (BWR), by the Argonne National Laboratory, and designed by the General Electric. In the following years, the plants continued to increase in US, having quadrupled between 1966 and 1997 (CHATER, 2005).

The Canadian Deuterium Uranium (CANDU), as indicated by its name, was the Canadian reactor, which had been first set up in 1962. Two years later, in the United Kingdom, the Magnox was developed, based on a magnesium-aluminium alloy. Similarly in 1964 the number of nuclear plants started to grow in the Soviet Union. But it was only in 1974 that the first large RBMK, with a 1.000 MW capacity, was started up.

With the oil crisis in the 1970s, the searches for an alternative to petroleum as a source of power generation increased. In response to such crisis, a huge nuclear program was launched in France by the Prime Minister Pierre Messmer. In James Chater words, “[n]owhere was the growth of nuclear power in the 1970s more dramatic than in France, where EDF embarked on an intensive programme of nuclear plant construction using Framatome’s N4, the first 100 per cent Frenchdesign of PWR” (CHATER, 2005).

According to the author, during the crisis, EUA, Europe and Japan made great efforts on searching alternatives, consequently increasing the reliance on nuclear power. Countries like Belgium, South Africa, South Korea and China imported French technology. Also, by the end of the 1970s, Germany (17 reactors between 1975 and 1989) Italy, Spain, the Netherlands, Switzerland, Czechoslovakia, Bulgaria, Japan, Argentina and North Korea had built reactors. This period of peak passed to times of stagnation since de 1980’s (World Nuclear Association, 2014).

Stagnation and loss of popularity

The disasters with the nuclear plants mentioned above (the first one in Three Mile Island - US, in 1979, and the second one in Chernobyl - former URSS, in 1986) served as important factors to undermine the support for the use of nuclear energy as a source of power. Such events increased the fears of the public opinion about the risks on the maintenance of nuclear energy reactors and the possible consequences originated by accidents.

On the other hand, in his article for the Brazilian magazine *Política Externa*, José Eli da Veiga says that

> [n]evertheless, what most feeds opinions and attitudes are the deep exaggerations about the consequences of the radiation provoked by the disasters in nuclear plants. The worst of them, Chernobyl, caused 47 deaths. High doses of radiation were fatal for 28 in 124 workers and rescuers directly affected ("acute radiation syndrome", ARS). Other 19 deaths were provoked by absurd, and completely avoidable, contamination from milk ingested for people who were children and adolescent in 1986 (VEIGA, 2011, free translation).

The contrarily opinions could be vastly seen in the United Nations Conference on Environment and Development occurred on 1992, in Rio de Janeiro, Brazil. The Earth Summit in Rio de Janeiro has been considered an unprecedented for United Nations conference, for the reason of the size and scope of the matters presented in its text.

The anti-nuclear critics were generally based on the costs involved in the use of nuclear energy, in other words, they are high either on civil safety or economic terms. Also there had been criticism, especially on that time of "Rio 92", due to the growing concernment about environmental issues, lying on what would be the destination of the toxic waste generated and how to guarantee the correct treatment and destination of such residues.

The nuclear energy's return to the scene

Despite of the passed facts related to the management of the nuclear energy plants and the reflexes generated over the public opinion against its use as a source of power, over de 1990s it newly start to became strong worldwide. A series of factors contributed to a new race after sources to attend the crescent demand for power, mainly electricity.

From this period, world started to see the important increase of the developing-countries' growth. In other words, such growth is translated, consequently, in an increased demand for electricity in order to sustain such development. Nevertheless, concernments with sustainability would not be put aside of the debates.

In this sense, the world also begun to see the crescent preoccupation with themes related to the fossil sources of energy and the consequences of its large and almost exclusive use as a source of energy (comparing to the alternatives). There should be put a limit to the carbon emission. States should find a way to diminish their large emission of carbon from the burns of oil, coal and gas, what was promoting global warming and climate changes.

The fear provoked, mainly, by the disaster in Chernobyl in 1986 became more distant. At the same time, public awareness of the importance of energy security increased. In spite of the argued high level of inversion and also to the central attention that must be present around its management, the nuclear energy appeared again as a 'clean' alternative for fossil based sources.

During de 1990s, the 'Third Generation' of reactors emerged. According to Chater's article, General Electric's Advanced Boiling Water Reactor (ABWR), Westinghouse's System 80+ Advanced Pressurized Water reactor (APWR) and Westinghouse's AP600 reactor were develop and certified. "In Canada, the AECL has developed the Advanced CANDU Reactor (ACR), of which three units have been sold to South Korea (1997-99) and two to China (Qinshan Phase III, 2002-2003, with more sales planned)" (CHATER, 2005).

Beyond that, another remarkable fact took place during that decade: the "Megatons to Megawatts" program. It was a treaty signed in 1993 between the

governments of United States and Russia and implemented in 1994. The agreement consisted in the purchase over the twenty years after its signing of the Russian high-enriched uranium (HEU) from nuclear disarmament and military stockpiles. Around the 2000s, 10% of the electricity used in the US was generated from the Russian's dismantled nuclear weapons (World Nuclear News, 2013).

Atomic energy as a source of electrical power: recent perspective

As it could be seen previously, the path of the nuclear power since the early 1940s until today has been permeated by periods of slower and faster advances. Nowadays, the discussion on this matter continues strong. Lots of countries encourage the progresses in researches concerning to the uses of the nuclear power.

On the other side, a considerably number of nations already has presented and put in practice their progressive plans for decommissioning their plants. Ahead recent information will be presented about such countries, namely, those which are persecuting the elimination of the nuclear plants and those who seek its maintenance. Furthermore, will be showed facts and data related to the nuclear energy and electricity generated and to the atomic reactors around the world.

Looking for advances

As cited above, many countries rely on the nuclear power as an important source of energy. According to the International Atomic Energy Agency (IAEA), throughout the world, nuclear production keeps growing and the performance of the reactors keep improving. Besides, the Agency mentions that a slow but steady growth is projected in the coming years.

The improvements on the nuclear field are a strong argument in favour of the use of atomic energy as a source of power. IAEA has been made strong efforts on amplifying the safety regarding to the exploitation of such energy. It is

worth to say that, by “safety”, a lot of areas are meant to be involved: infrastructure security, legal framework, correct toxic waste managing and so on. Yet, the Agency emphasises the role of the international cooperation and coordination for that (IAEA, 2013).

Alongside with the safety preoccupation come the great concernments about the environment and climate changes. Generate electricity through exploring nuclear power has been reinforced significantly as a ‘cleaner’ way. The Director General of IAEA said in the last Agency’s Bulletin that “Nuclear science, including nuclear power, can play a significant role in both climate change mitigation and adaptation” (IAEA, 2015).

A considerable amount of countries keep their confidence in nuclear energy as a source of power. Among them, we can cite more consistently United States, France, Russia, India, Great Britain, Canada, China, South Korea and other smaller European countries. In fact, according to the World Nuclear Association, despite the importance given by USA and Europe for the nuclear matter, they have been overshadowed by China and South Korea. “China alone plans and is building towards a huge increase in nuclear power capacity by 2020, (…) backed by credible political determination and popular support.” (World Nuclear Association, 2014)

Moving away

As pointed before**,** another group of countries is moving on the contrary way. Since the beginning of the 2000s, the number of nations which are looking for decommissioning their nuclear plants have increased. Similarly as the case of the supporters of nuclear energy advance, there are many arguments against its conservation.

Among the main arguments, one concerns to the quantity of investment. Critics say that the cost of development, maintenance and, after, decommission is too high. On the other hand, it is supported that such amount of inversion could be directed to the development of renewable sources of energy. According to

Greenpeace website, renewable energy already delivers more energy worldwide than the nuclear power (Greenpeace, 2007).

Albeit a lot progress have been made on safety issues concerning to the nuclear plants, the dramatic disaster occurred in Chernobyl back in 1986 still remains very present on peoples' mind. Moreover, another grave nuclear accident happened, bringing back those memories. This accident was caused by the natural catastrophe which hit Japan in 2011, consequently provoking the nuclear disaster on the Fukushima I Nuclear Power Plant.

After a huge earthquake, a tsunami struck Japan's Fukushima Daiichi power station. There were six active reactors on the plant, and three of them melted down in the accident's occasion. The disaster was classified as a level 7 on the International Nuclear Event Scale, similarly to Chernobyl's disaster. A great amount of radiation was released, although the worst problem concerns to radioactive water. Despite no direct exposition to the radiation happened, about 300.000 people were evacuated from the affected area.

Another negative critic lies over the security of the nuclear facilities and materials regarding to personal attacks. As the IAEA itself demonstrate, a lot of concernment is focused on these questions. The panic caused by terrorist attacks begun to rise expressively in the 2000s, namely after the attacks of 9/11 in the United States and, consequently, the emersion of this "new" threat.

For all above and mostly after Fukushima's nuclear disaster, to enumerate some countries that already decided to gradually abandon their nuclear plans and progressively decommissioning them, we can cite Germany, Switzerland, Belgium and Japan itself. Also, Italy has cancelled the resumption of its nuclear industry. Indeed, in the European Union, beyond the cited countries, Austria, Denmark, Greece, Ireland and Portugal are strongly anti-nuclear (The Economist, 2011).

Nuclear power: a brief look over the numbers

The following, some numbers and facts will be shown about the nuclear plants, production of electrical energy and reactors worldwide. The information has been taken from the official websites of International Atomic Energy Agency and from the World Nuclear Association.

In the table below are exposed the ten first countries with the most of their electricity produced from nuclear plants (World Nuclear Association, 2014):

Country	%
France	76,9
Slovakia	56,8
Hungary	53,6
Ukraine	49,4
Belgium	47,5
Sweden	41,5
Switzerland	37,9
Slovenia	37,2
Czech Republic	35,8
Finland	34,6

Throughout the world, 437 reactors are currently in operation and other 67 are under construction (numbers last updated by IAEA in 2015). Likewise has been done above, in the following table we can see where are concentrated these reactors, showing the 10 principal holders.

Country	Number of reactors
USA	99
France	58
Japan	43
Russia	34
China	27
Republic of Korea	24

India	21
Canada	19
United Kingdom	16
Ukraine	15

Additionally, the World Nuclear Association displays a table containing data of the countries' nuclear share during a period of ten years, from 2004 to 2014. In that table, we can observe the trends presented by some countries, like how they are inclined to diminish or to increase the nuclear electricity production. Among those who remarkably diminished are Germany, Bulgaria and Sweden (respectively, 31,1% to 15,8%, 41,6% to 31,8% and 51,8% to 41,5%). Those who increased are Romania (10,1% to18,5%), Hungary (33,8% to 53,6%), Finland (26,6% to 34,6%) and Czech Republic (31,2% to 35,8%).

Finally, two specific cases are treated apart. The first one concerns to Lithuania. This country, after depends 76,2% on the nuclear electricity production on the year 2009, suddenly ended the production since 2010. The last case refers to Japan. Japanese nuclear electricity production had its peak in 2006, having produced 30% of the countries' necessity. In the year before the nuclear disaster in Fukushima Daiichi, this number were of 29,2%. After the tragedy, from 18,1% in 2011, Japanese production fell abruptly, until reaches 0% in 2014.

Conclusion

The discussion presented during this guide had the intention of proposing an introduction about the nuclear power matter, calling attention to the question of nuclear electricity production. All through the text we have also sought to clarify a little of the historical issues concerning to the development of the nuclear power, such as the ways it has been used, problems generated and the like.

The debate involving atomic power has grown substantially since the 2000s and the crescent environmental concernments. Furthermore, the mentioned disaster occurred in Fukushima Daiichi revived the preoccupations

about using that source of energy. According with what was viewed, lots are countries decided to progressively abandon their nuclear dependency.

Notwithstanding, there are many other countries that clearly decided to invest on nuclear power and even to increase its production. Namely, the Chinese case is the most impressive. Its mentioned plans intend to amplify by more than a hundred the number of the reactors operating in the country.

In addition, the International Atomic Energy Agency has been working strongly in order to improve the international cooperation for the peaceful uses of nuclear power. According to the Agency, besides all of the utilities which could be taken from nuclear power, its use could be crucial regarding to the production of electricity, given that its management is each time safer and consequently it could be an essential alternative to combat global warming.

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