Hacettepe University Graduate School of Social Sciences

International Relations

POLITICS OF NUCLEAR ENERGY

NUCLEAR ENERGY AS A DETERMINANT IN INTERNATIONAL RELATIONS

Volkan Güner

Master's Thesis

Ankara, 2013

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gerçek kahramanlarıma; anneme ve babama...

ÖZET

GÜNER, Volkan. Nükleer Enerji Politikaları: Uluslararası İlişkilerde Bir Belirleyici Olarak Nükleer Enerji, Yüksek Lisans Tezi. Ankara, 2013.

Bu tez, nükleer enerjinin uluslararası politikadaki önemini ve aslında nükleer enerji meselesinin, teknik ve çevresel konulardan bağımsız olarak bir politika öğesi olduğu argümanını savunmaktadır. Bu çalışmada nükleer enerjinin ne olduğu ve nasıl elde edildiği anlatılmış, bu noktadan hareketle nükleer enerjinin bir ülkeye nasıl büyük bir güç sağlayacağı ortaya konmuştur. Bu büyük gücün ise nasıl bir uluslararası politika enstrümanına dönüştürüldüğü, yasal ve yasal olmayan yollar ile nükleer enerjinin, nükleer teknolojiye sahip ülkeler tarafından tekelleştirilmeye çalışıldığı anlatılmaktadır. Diğer enerji kaynaklarından farksız olarak, nükleer enerjinin de bir çatışma ve sömürü kaynağı olduğu ise bu tezin temel savıdır. Nükleer teknoloji barışçıl amaçlar için kullanıldığında bütün insanlığa refah getirebilecek, bütün dünyaya gelişmişliğin kapılarını açacak bir araçtır. Çalışma sırasında kitaplar, süreli yayınlar, raporlar, internet üzerinden erişilebilen bilimsel materyaller, gazete yayınları ve kişisel olarak gerçekleştirilen röportajlar kullanılmıştır.

Anahtar Sözcükler

Nükleer Enerji, Nükleer Teknoloji ,Uluslararası İlişkiler,Küresel Hegemonya , Enerji Kaynaklı Çatışmalar

ABSTRACT

GÜNER, Volkan. Politics of Nuclear Energy: Nuclear Energy as a Determinant in International Relations, Master's Thesis, Ankara, 2013.

This thesis tries to underline the significance and importance of nuclear energy in internatinal politics independent of the technical and environmental discussions of nuclear energy. Aim is to prove that nuclear energy is an important element of world politics and energy policies. This work explains properties of nuclear energy and how to produce it to strenghten a state. Both political and technological power which is derived by nuclear energy turns into a instrument of politics, legally and illegally. Nuclear technology is monopolized by the states which own this technology and indifferent of other energy sources, nuclear energy is also a source of exploitation and conflict. Nuclear technology is the key for all world countries for prosperity and becoming a developed country when it is used for peaceful purposes. During the study, books, periodicals, internet resources, newspapers and personal interviews are used.

Key Words

Nuclear Energy , Nuclear Technology , International Relations , Global Hegemony , Energy Conflicts

CONTENTS

ABBREVIATIONS

AECL - Atomic Energy of Canada

AM-1 - Atom Mirny - Peaceful Atom

ASEAN - Association of Southeast Asian Nations

AVLIS - Atomic Vapor Laser Isotope Separation

BN - Sodium Cooled Fast Breeder Reactor

BR - Bystry Reaktor - Fast Reactor

BWR - Boiling Water Reactor

CANDU - Canada Deuterium Uranium

CD - Conference on Disarmament

CIA - USA Central Intelligence Agency

CTBT - Comprehensive Nuclear Test Ban Treaty

DIA - USA Defence Intelligence Agency

DOE - USA Department of Energy

EU - European Union

EURATOM - The European Atomic Energy Community

FBR - Fast Breeding Reactor

FEI - The Institute of Physics and Power Engineering

FTI - Physico-Technical Institute

GPS - Global Positioning System

GW - Gigawatt

HEU - Highly Enriched Uranium

IAEA - International Atomic Energy Agency

ICBM - Intercontinental Ballistic Missiles

ICI - Imperial Chemical Industries

KOICA - Korea International Cooperation Agency

LIPAN - Laboratory of Measurement Instruments

MAUD - Military Application of Uranium Detonation

MENA - Middle East and North Africa

MW - Megawatt

NATO - North Atlantic Treaty Organization

NNWS - Non-Nuclear Weapon State

NPT - Non-Proliferation Treaty

NSG - National Security Guard

NWS - Nuclear Weapon State

PNE - Peaceful Nuclear Explosions

Pu - Plutonium

PWR - Pressurized Water Reactor

RBMK - Reaktor Bolshoi Moshchnosty Kanalny - High Power Channel Reactor

RCC - Revolutionary Command Council

START - Strategic Arms Reduction Treaty

U - Uranium

UN - United Nations

US - United States

USSR - The Union of Soviet Socialist Republics

USA - United States of America

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INTRODUCTION

It is mainly argued that nuclear energy is the longest lasting and most powerful energy resource in the world. Having nuclear technology and producing nuclear energy are the two of the issues for being a powerful state for both fast improvement in industry and nuclear weapon production. Political and military pressure upon non-nuclear states to prevent them from having nuclear technology is one of the key elements while shaping international relations of world states. Reasons and results of state actions on the basis of nuclear politics will be examined.

The purpose of this study is to examine, describe and analyze the effect of Nuclear Energy and Nuclear Technology in regional and global politics. There is a huge similarity in the processes in accessing nuclear energy in between nuclear super states and third world states who are trying to obtain nuclear energy. Actually having nuclear technology is not only mean to have mass energy production but also nuclear technology is the key for future development of technology.

Another important focus of this work will be the international law which was shaped by superpowers to gain and protect superiority in nuclear technology. Actions against the states which are trying to obtain nuclear energy generally depend on their geographic location and their attitudes against the super powers and national interests of superpowers. Superpowers are helping some states to obtain nuclear energy for weakening other conflicting state or they prevent the states which are described as threat to the world society. All the facts behind those actions will be revealed and nuclear map of the world will be defined.

This topic has been chosen to distinguish the effect of nuclear energy in world politics. Nuclear energy may produce a huge prosperity for human kind but also it has a huge destructive force to tear apart all humanity and civilization. It is generally hard to realize

and understand the policies of states which are developed on the basis of nuclear energy. Hidden meanings behind the actions which are aimed to enlarge the area of effect through nuclear technology will have a huge help to reason the regional and global politics. Nuclear energy is a determinant element of international relations and world politics especially after the Second World War. This research will examine and analyze the development of nuclear energy politics and future of it through the actions of the players within the politics of nuclear energy.

1. NUCLEAR ENERGY AND USES OF NUCLEAR ENERGY

Before going into the politics of nuclear energy, it is essential to explain what is nuclear energy and uses of it.

Nuclear technology is the application of nuclear sciences which includes reactions and productions related to nucleus and these applications contain wide fields of study.[1] Nuclear energy can be defined simply as the energy which emerges by the fission or fussion of the nuclei. Nuclear power plants produce energy by the heat which is produced by the nuclear reactions. Nuclear techniques make it possible to use nuclear technology in the fields which can be briefly listed as medicine, industry, agriculture, environment, food security, consumer productions, military implements, space studies.[2] This study will not go further into the technical details of nuclear energy but some other details will be discussed in the next chapters.

To answer the question "How nuclear energy can be a determinant in International Relations?", first the dimension and capability of nuclear energy should be understood.

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[1].Akın Dalbudak, "Establishment of Nuclear Power Plant in Turkey and Its probable Effects on Turkish Foreign Policy" (Master's Thesis, Hacettepe University, 2009) 3

[2]Ibid

2. NUCLEAR TECHNOLOGY AND NUCLEAR POWER PLANTS

2.1 NUCLEAR POWER PLANTS

Nuclear power plant is a site where the heat is produced in a reactor by the fissioning of nuclear fuel and where the heat is used to drive a steam turbine[3].

This part of the work will concentrate the context of atom, fission and fusion, which are the basic processes of producing nuclear energy.

2.2 ATOM

According to above, for understanding how nuclear power plants work, need to know some basic information about atoms. Atoms create substances therefore atoms are the basic building stones of everything. In fact, the smallest things that are proton neutron and electron create atoms. Protons and neutrons are located in centre of atoms and they constitute the weight of the atom, indeed. This center is called as nucleus of the atom. While protons carry positive electric charge, electrons carry negative charge and neutrons are neutral. If the number of protons and neutrons increase, the weight of the atom increases also. That means the weight of atom occurs from accumulation of neutrons and protons. For instance, Uranium has 92 protons and 143 neutrons, so weight of Uranium is 92+143=235. It can be said that Uranium -235 or U-235. In atoms, objective of the neutron is to keep the pieces of atom together and every nucleus may be steady on condition that it has determined number of neutrons. That means, the number of neutron defines the stability of atoms.

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[3]Akın Dalbudak, "Establishment of Nuclear Power Plant in Turkey and Its probable Effects on Turkish Foreign Policy" (Master's Thesis, Hacettepe University, 2009) 3

If the number of neutrons is under or above the required number for stability, atoms become unstable and while they are unstable they attempt to convert the excessive pieces or energy to become stable. If they convert this energy to pieces, this can be hazardous for the living creatures.[4]These unstable atoms are named as radioactive substances. When the difference between the number of neutrons and protons of an atom gets higher, the atom becomes more radioactive. While the nucleus of atom becomes heavier, the requirement for the neutron boosts to keep the nucleus together.[5]

2.3 FISSION AND FUSION

Nuclear energy can be described as an energy that results from disintegration or association of nucleus. A great quantity of energy is released, as the nucleus is disintegrated or associated. In physics, association process of nucleus is named as fusion and disintegration process of atom is named as fission. Therefore, it is requested to unfold the contexts of fission and fusion in a basic standard to understand these processes. According to above, disintegration of nucleus that is fission produces great energy and this process is executed through heavy nuclei bombarded with neutrons. Bombarded atoms-for example Uranium 235- ejecting two or three neutrons cause more Uranium atoms to divide. Actually, hydrogen atoms should be heated with very high temperatures for making fusion, so they have adequate energy to be associated. This process exposes great amount of energy.[6]

4Akın Dalbudak, "Establishment of Nuclear Power Plant in Turkey and Its probable Effects on Turkish Foreign Policy" (Master's Thesis, Hacettepe University, 2009) 4

5Ibid

6Ibid

2.4 NUCLEAR POWER PLANTS: HOW THEY WORK AND GENERAL FEATURES

As it was described above, nuclear power plants are heat generating systems. The heat arises from the controlled nuclear chain, disintegration reactions to produce electric energy. In fact, producing energy through nuclear power plants' principles is same with producing energy using gas and coal plants. The difference between these is the heat source. In nuclear power plant, the energy is used to generate steam is released from the continuous fission of nuclei of the atoms in the fuel and the steam is used to drive turbines producing electricity. Present-day, certain fissile heavy atoms are being used as the source of nuclear energy by nuclear power plants. In the nature, uranium-235isthe only source for nuclear energy that is used in today's nuclear power plants. The percentage of natural fissile U-235 is less than 1 percent and thus, in order to convert the uranium to fuel, its U-235 content is increased to between 3 and 5 percent using a reinforcement process.[7]

Scientists discovered that if the neutrons bombard the nucleus of uranium-235 atom, atom immediately splitsinto two new nuclei and this separation reveal nuclear energy. In the artificial environment, (in nuclear power plants) while nucleus of uranium-235 splits, two or three neutrons are produced, these neutrons diffuse to environment randomly and they bombard other uranium-235 atoms. Result of this process is a chain reaction in which every fission releases the nuclear energy.

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[7]Akın Dalbudak, "Establishment of Nuclear Power Plant in Turkey and Its probable Effects on Turkish Foreign Policy" (Master's Thesis, Hacettepe University, 2009) 7

Even if there are different types of nuclear power plants, producing nuclear energy includes same main components.[8]

These are mainly fuel, moderator, coolant and control rods.

- Fuel: This is the material in which nuclear reaction is obtained and it is embedded in a zirconium cladding. Nearly all of the nuclear power plants use Uranium as the fuel for now. The fuel in most of the power plants today is enriched.

- Moderator: Moderator is used to decrease the speed of moving neutron which is generated as a result of disintegration because researches pointed out that the neutron's probability to hit the atom's (Uranium's) nucleus increases if it moves slowly. Mostly water is used as the moderator and it is placed in between the fuel rods.

- Coolant: This is the gas or liquid that is used to transport the heat produced during the fission from the fuel. The coolant can be water, deuterium, helium and so on.

- Control Rods: They are used to control the energy production and finish it when necessary. As explained above, disintegration is realized via neutrons and control rods absorb these neutrons.

In addition, there are additional systems used to measure the heat, pressure, level of radioactivity, power level and so on. Throughout the nuclear reaction in nuclear power plants, approximately 0.1% of the original mass is converted into energy[9]

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[8] Akın Dalbudak, "Establishment of Nuclear Power Plant in Turkey and Its probable Effects on Turkish Foreign Policy" (Master's Thesis, Hacettepe University, 2009) 7

9Ibid

2.5 DEVELOPMENT OF NUCLEAR TECHNOLOGY

A German chemist Martin Klaproth discovered Uranium in 1789 and named after the planet Uranus. Wilhelm Rontgen discovered ionising radiation in 1895, by passing electric current through a discharge glass tube and producing continuous X-rays. In 1896 Henri Becquerel found that pitchblende (an ore containing radium and uranium) caused a photographic plate to darken. He went on to prove that this was due to beta radiation (electrons) and alpha particles (helium nuclei) being emitted.[10]

Villard found a third type of radiation from pitchblende: gamma rays, which were much the same as X-rays. Then in 1896 Pierre and Marie Curie gave the name 'radioactivity' to this phenomenon and in 1898 isolated polonium and radium from the pitchblende. Radium was later used in medical treatment. In 1898 the radiation that destroyed bacteria in food had been showed by Samuel Prescott.[11]

In 1902 Ernest Rutherford showed that radioactivity as a spontaneous event emitting an alpha or beta particle from the nucleus created a different element. He went on to develop a fuller understanding of atoms and in 1919 he fired alpha particles from a radium source into nitrogen and found that nuclear rearrangement was occurring, with formation of oxygen. Niels Bohr was another scientist who advanced our understanding

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10Thormod Henriksen and H. David Maillie. Radiation and Healt. Taylor & Francis. 2003 267
11Hore- Lacy. Ian. Nuclear Energy in the 21st Century: World Nuclear University Press. 140. 2010

of the atom and the way electrons were arranged around its nucleus through to the 1940s.[12]

By 1911 Frederick Soddy discovered that naturally-radioactive elements had a number of different isotopes (radionuclides), with the same chemistry. Also in 1911, George de Hevesy showed that such radionuclides were invaluable as tracers, because minute amounts could readily be detected with simple instruments.[13]

In 1932 the neutron had been discovered by James Chadwick. Also in 1932 Cockcroft and Walton produced nuclear transformations by bombarding atoms with accelerated protons, then in 1934 Irene Curie and Frederic Joliot found that some such transformations created artificial radionuclides. The next year Enrico Fermi found that a much greater variety of artificial radionuclides could be formed when neutrons were used instead of protons.[14]

Fermi proceeded his experiments, mostly producing heavier elements from his targets, but also, with uranium, some much lighter ones. At the end of 1938 Otto Hahn and Fritz Strassman in Berlin showed that the new lighter elements were barium and others which were about half the mass of uranium, thereby proved that atomic fission had occurred. Lise Meitner and her nephew Otto Frisch, working under Niels Bohr, then explained this by suggesting that the nucleus contained the neutron, causing severe

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12"Rutherford, Ernest." Complete Dictionary of Scientific Biography. 2008. Encyclopedia.com. 7 Jul. 2013<http://www.encyclopedia.com>.
13Hore- Lacy, Ian. Nuclear Energy in the 21st Century: World Nuclear University Press, 140, 2010
14Ibid

vibration leading to the nucleus splitting into two not quite equal parts. They calculated about 200 million electron volts energy release from this fission. Frisch then confirmed this figure experimentally in January 1939.[15]

This was the first experimental confirmation of Albert Einstein's paper putting forward the equivalence between mass and energy, which had been published in 1905.[16]

These developments encouraged activity in many laboratories. Hahn and Strassman showed that fission released a lot of energy besides released also additional neutrons which could cause fission in other uranium nuclei and possibly a self-sustaining chain reaction leading to a tremendous release of energy. In Paris,Joliot and his co-workers immediately confirmed this suggestion and Leo Szilard working with Fermi in New York.

Bohr soon recommended that fission was much more likely to occur in the uranium-235 isotope than in U-238 and that fission would occur more effectively with slow-moving neutrons than with fast neutrons, the latter point being confirmed by Szilard and Fermi, who proposed using a 'moderator' to slow down the emitted neutrons. Bohr and Wheeler's ideas had been spread and became the classical analysis of the fission process.and then their paper was published only two days before war broke out in 1939.[17]

15Hore- Lacy, Ian. Nuclear Energy in the 21st Century: World Nuclear University Press, 140, 2010
16Albert Einstein (1905) "Zur Elektrodynamik bewegter Körper", Annalen der Physik 17: 891; English translation On the Electrodynamics of Moving Bodies byGeorge Barker Jeffery and Wilfrid Perrett (1923); Another English translation On the Electrodynamics of Moving Bodies by Megh Nad Saha (1920)
17Hore- Lacy, Ian. Nuclear Energy in the 21st Century: World Nuclear University Press, 141, 2010

Another important factor was that U-235 was then known to comprise only 0.7% of natural uranium, with the other 99.3% being U-238, with similar chemical properties. Therefore the separation of the two to obtain pure U-235 would be difficult and would require the use of their very slightly different physical properties. This increase in the proportion of the U-235 isotope became known as 'enrichment'.[18]

Francis Perrin, who introduced the concept of the critical mass of uranium needed to produce a self-sustaining release of energy, ensured the remaining piece of the fission/atomic bomb concept in 1939. Rudolf Peierls evolved Perrin's theories at Birmingham University and the results were assumed importance in the development of the atomic bomb. Perrin's group in Paris continued their studies and demonstrated that a chain reaction could be sustained in a uranium-water mixture (the water being used to slow down the neutrons) provided external neutrons were injected into the system. They also demonstrated the idea of introducing neutron-absorbing material to limit the multiplication of neutrons and thus control the nuclear reaction (which is the basis for the operation of a nuclear power station).[19]

Peierls had been a student of Werner Heisenberg, who from April 1939 presided over the German nuclear energy project under the German Ordnance Office. Initially this was directed towards military applications, but by 1942 the military objective was abandoned as impractical. However, the existence of the German Uranverein project

18Hore- Lacy, Ian. Nuclear Energy in the 21st Century: World Nuclear University Press, 141, 2010
19Ibid

provided the main incentive for wartime development of the atomic bomb by Britain and the USA.[20]

Russian nuclear physics studies started more than ten years before the Bolshevik Revolution. Work on radioactive minerals found in central Asia began in 1900 and the St Petersburg Academy of Sciences began a large-scale investigation in 1909. The 1917 Revolution improved the scientific research and over 10 physics institutes were established in major Russian towns. especially St Petersburg. in the years which followed. In the 1920s and early 1930s many foremost Russian physicists. includes Kirill Sinelnikov. Pyotr Kapitsa and Vladimir Vernadsky. worked abroad. encouraged by the new regime initially as the best way to raise the level of expertise quickly.[21]

By the early 1930s there were several research centresspecialising in nuclear physics. Kirill Sinelnikov returned from Cambridge in 1931 to organise a department at the Ukrainian Physico-Technical Institute (FTI) in Kharkov which had been set up in 1928.Academician Abram Ioffe established another group at Leningrad FTI (including the young Igor Kurchatov). then in 1933 Kurchatov converted that group to Department of Nuclear Physics with four separate laboratories.[22]

By the end of the decade. there were cyclotrons installed at the Radium Institute and Leningrad FTI (the biggest in Europe). But until this time Stalin purged many scientists

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20Hore- Lacy. Ian. Nuclear Energy in the 21st Century: World Nuclear University Press. 141. 2010
21Ibid
22Ibid

– for example, half the staff of Kharkov FTI, was arrested in 1939. In spite of this stuation, 1940 saw great advances being made in the understanding of nuclear fission including the possibility of a chain reaction. VitalyKholpin chaired the Academy of Sciences set up a "Committee for the Problem of Uranium" in June 1940 chaired by demands of Kurchatov and his colleagues, and a fund was established to investigate the central Asian uranium deposits. Germany's invasion of Russia in 1941 turned much of this fundamental research to potential military applications.[23]

British scientists had kept pressure on their government. The emigrant physicists Peierls and Frisch (who had stayed in England with Peierls after the outbreak of war), drives to the concept of the atomic bomb in Frisch-Peiers Memorandum that is a three-page document. In this they estimated that an amount of about 5kg of pure U-235 could make a very powerful atomic bomb equivalent to several thousand tons of dynamite. They also suggested how they could explode such a bomb, how could produce the U-235, and what the radiation effects might be in addition to the explosive effects. They proposed thermal diffusion as a suitable method for separating the U-235 from the natural uranium. This memorandum stimulated a considerable response in Britain at a time when there was little interest in the USA.[24]

The MAUD Committee which was a group of exclusive scientist was set up in Britain and supervised research at the Universities of Birmingham, Bristol, Cambridge, Liverpool and Oxford. The chemical problems of producing gaseous compounds of

23Hore- Lacy, Ian. Nuclear Energy in the 21st Century: World Nuclear University Press, 141, 2010
24Hore- Lacy, Ian. Nuclear Energy in the 21st Century: World Nuclear University Press, 143, 2010

uranium and pure uranium metal were studied at Birmingham University and Imperial Chemical Industries (ICI). Dr Philip Baxter at ICI made the first small batch of gaseous uranium hexafluoride for Professor James Chadwick in 1940. ICI received a formal contract later in 1940 to make 3kg of this vital material for the future work. Most of the other research was funded by the universities themselves.[25]

Cambridge studies brought out two important developments. The first was experimental proof that a chain reaction could be sustained with slow neutrons in a mixture of uranium oxide and heavy water, ie. The output of neutrons was greater than the input. The second was by Bretscher and Feather based on earlier work by Halban and Kowarski soon after they arrived in Britain from Paris. When U-235 and U-238 absorb slow neutrons, the probability of fission in U-235 is much greater than in U-238. The U-238 is more likely to form a new isotope U-239, and this isotope rapidly emits an electron to become a new element with a mass of 239 and an Atomic Number of 93. This element also emits an electron and becomes a new element of mass 239 and Atomic Number 94, which has a much greater half-life. Bretscher and Feather argued on theoretical grounds that element 94 would be readily fissionable by slow and fast neutrons, and had the added advantages that it was chemically different to uranium and therefore could easily be separated from it.[26]

This new development was also approved in independent work by McMillan and Abelson in the USA in 1940. DrKemmer of the Cambridge team proposed the names

25Hore- Lacy, Ian. Nuclear Energy in the 21st Century: World Nuclear University Press, 143, 2010
26Ibid

neptunium for the new element # 93 and plutonium for # 94 by analogy with the outer planets Neptune and Pluto beyond Uranus (uranium, element # 92). The Americans fortuitously suggested the same names, and the identification of plutonium in 1941 is generally credited to Glenn Seaborg.[27]

2.5.1 THE ATOMIC BOMB

By the end of 1940 remarkable progress had been made by the several groups of scientists coordinated by the MAUD Committee and for the expenditure of a relatively small amount of money. All of this work was kept secret, whereas in the USA several publications continued to appear in 1940 and there was also little sense of urgency.[28]

By March 1941 one of the most uncertain pieces of information was confirmed - the fission cross-section of U-235. Peierls and Frisch had initially predicted in 1940 that almost every collision of a neutron with a U-235 atom would result in fission, and that both slow and fast neutrons would be equally effective. It was later discerned that slow neutrons were very much more effective, which was of enormous significance for nuclear reactors but fairly academic in the bomb context. Peierls then stated that there was now no doubt that the whole scheme for a bomb was feasible provided highly enriched U-235 could be obtained. The predicted critical size for a sphere of U-235 metal was about 8kg, which might be reduced by use of an appropriate material for

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27Hore- Lacy, Ian. Nuclear Energy in the 21st Century: World Nuclear University Press, 143, 2010
28Ibid

reflecting neutrons. However, direct measurements on U-235 were still necessary and the British pushed for urgent production of a few micrograms.[29]

The last resultant of the MAUD Committee was two summary reports in July 1941. One was on 'Use of Uranium for a Bomb' and the other was on 'Use of Uranium as a Source of Power'. The first report concluded that a bomb was feasible and that one containing some 12 kg of active material would be equivalent to 1,800 tons of TNT and would release large quantities of radioactive substances which would make places near the explosion site dangerous to humans for a long period.[30] It estimated that a plant to produce 1kg of U-235 per day would cost ?5 million and would require a large skilled labour force that was also needed for other parts of the war effort. Suggesting that the Germans could also be working on the bomb, it recommended that the work should be continued with high priority in cooperation with the Americans, even though they seemed to be concentrating on the future use of uranium for power and naval propulsion.

The second MAUD Report concluded that the controlled fission of uranium could be used to provide energy in the form of heat for use in machines, as well as providing large quantities of radioisotopes which could be used as substitutes for radium. It referred to the use of heavy water and possibly graphite as moderators for the fast neutrons, and that even ordinary water could be used if the uranium was enriched in the

29Hore- Lacy, Ian. Nuclear Energy in the 21st Century: World Nuclear University Press, 143, 2010
30Ibid

U-235 isotope.[31] It concluded that the 'uranium boiler' had considerable promise for future peaceful uses but that it was not worth considering during the present war.The Committee submitted that Halban and Kowarski should move to the USA where there were plans to make heavy water on a large scale. Because of the possibility of mentioned new element that might be more suitable than U-235 which is plutonium, so that Bretscher and Feather should be continued in Britain work for that.[32]

Both of these reports led to a complete reorganization of work on the bomb and the 'boiler'. It was claimed that the work of the committee had put the British in the lead and that "in its fifteen months' existence it had proved itself one of the most effective scientific committees that ever existed". The Prime Minister, Winston Churchill, with the agreement of the Chiefs of Staff would pursue hastily the basic decision that bomb project. The reports also led to high level reviews in the USA, especially by a Committee of the National Academy of Sciences, at first concentrate on the nuclear power aspect. Little emphasis was given to the bomb concept until 7 December 1941, when the Japanese attacked Pearl Harbour and the Americans entered the war directly.[33] The huge resources of the USA were then applied without reservation to developing atomic bombs.

The Americans increased their effort rapidly and soon outstripped the British. With some information exchange.this research continued in each country.Several of the key British scientists visited the USA early in 1942 and they were given full access to all of

31Hore- Lacy, Ian. Nuclear Energy in the 21st Century: World Nuclear University Press, 143, 2010
32Ibid
33Hore- Lacy, Ian. Nuclear Energy in the 21st Century: World Nuclear University Press, 144, 2010

the information available. The Americans were pursuing three enrichment processes in parallel: Professor Lawrence was studying electromagnetic separation at Berkeley (University of California), E. V. Murphree of Standard Oil was studying the centrifuge method developed by Professor Beams, and Professor Urey was coordinating the gaseous diffusion work at Columbia University. Responsibility for building a reactor to produce fissile plutonium was given to Arthur Compton at the University of Chicago. The British were only examining gaseous diffusion.[34]

In June 1942 ,the US Army took over process development, engineering design, procurement of materials and site selection for pilot plants for four methods of making fissionable material (because none of the four had been shown to be clearly superior at that point) as well as the production of heavy water. Information flow to Britain dried up with this change. This was a major setback for the British and the Canadians who had been collaborating on heavy water production and on several aspects of the research program. After all, Churchill sought information on the cost of building a diffusion plant, a heavy water plant and an atomic reactor in Britain.[35]

After many months of negotiations an agreement was finally signed by Mr Churchill and President Roosevelt in Quebec in August 1943.According to these, the British handed over all of their reports to the Americans and in return received copies of General Groves' progress reports to the President. The latter showed that the entire US

34Hore- Lacy, Ian. Nuclear Energy in the 21st Century: World Nuclear University Press, 144, 2010
35Ibid

program would cost over $1.000 million, all for the bomb, because no work was being done on other applications of nuclear energy.[36]

Construction of production plants for electromagnetic separation (in calutrons) and gaseous diffusion was well under way. An experimental graphite pile constructed by Fermi had operated at the University of Chicago in December 1942 that was the first controlled nuclear chain reaction.[37]

A full-scale production reactor for plutonium was being constructed at Argonne, with further ones at Oak Ridge and then Hanford, plus a reprocessing plant to extract the plutonium. Four plants for heavy water production were being built, one in Canada and three in the USA. A team under Robert Oppenheimer at Los Alamos in New Mexico was working on the design and construction of both U-235 and Pu-239 bombs.[38] The outcome of the huge effort, with assistance from the British teams, was that sufficient Pu-239 and highly enriched U-235 (from calutrons and diffusion at Oak Ridge) was produced by mid-1945. The uranium mostly originated from the Belgian Congo.[39]

The first atomic device tested successfully at Alamagordo in New Mexico on 16 July 1945. It used plutonium made in a nuclear pile. The teams did not consider that it was necessary to test a simpler U-235 device. The first atomic bomb, which contained U-235, was dropped on Hiroshima on 6 August 1945. The second bomb, containing Pu-

36Hore- Lacy, Ian. Nuclear Energy in the 21st Century: World Nuclear University Press, 144, 2010
37Hore- Lacy, Ian. Nuclear Energy in the 21st Century: World Nuclear University Press, 146, 2010
38Ibid
39Ibid

239, was dropped on Nagasaki on 9 August. At the same date, the USSR declared war on Japan. On 10 August 1945,the Japanese Government surrendered.[40]

Initially Stalin was not enthusiastic about diverting resources to develop an atomic bomb, until intelligence reports suggested that such research was under way in Germany, Britain and the USA. Consultations with Academicians Ioffe, Kapitsa, Khlopin and Vernadsky convinced him that a bomb could be developed relatively quickly and he initiated a modest research program in 1942.[41] Igor Kurchatov, then relatively young and unknown, was chosen to head it and in 1943 he became Director of Laboratory No.2 recently established on the outskirts of Moscow. This was later renamed LIPAN, then became the Kurchatov Institute of Atomic Energy. Overall responsibility for the bomb program rested with Security Chief Lavrenti Beria and its administration was undertaken by the First Main Directorate (later called the Ministry of Medium Machine Building).[42]

Research had three main aims: to achieve a controlled chain reaction; to investigate methods of isotope separation; and to look at designs for both enriched uranium and plutonium bombs. Attempts were made to initiate a chain reaction using two different types of atomic pile: one with graphite as a moderator and the other with heavy water. Three possible methods of isotope separation were studied: counter-current thermal diffusion, gaseous diffusion and electromagnetic separation.[43]

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[40]Hore- Lacy, Ian, Nuclear Energy in the 21st Century: World Nuclear University Press, 146, 2010
[41]Hore- Lacy, Ian, Nuclear Energy in the 21st Century: World Nuclear University Press, 146, 2010
[42]Ibid
[43]Hore- Lacy, Ian, Nuclear Energy in the 21st Century: World Nuclear University Press, 145, 2010

After the defeat of Nazi Germany in May 1945, German scientists were "recruited" to the bomb program to work in particular on isotope separation to produce enriched uranium. This included research into gas centrifuge technology in addition to the three other enrichment technologies.[44]

The test of the first US atomic bomb in July 1945 had little impact on the Soviet effort, but by this time, Kurchatov was making good progress towards both a uranium and a plutonium bomb. He had begun to design an industrial scale reactor for the production of plutonium, while those scientists working on uranium isotope separation were making advances with the gaseous diffusion method.[45]

It was the bombing of Hiroshima and Nagasaki the following month which gave the program a high profile and construction began in November 1945 of a new city in the Urals which would house the first plutonium production reactors -- Chelyabinsk-40 (Later known as Chelyabinsk-65 or the Mayak production association). This was the first of ten secret nuclear cities to be built in the Soviet Union. The first of five reactors at Chelyabinsk-65 came on line in 1948. This town also housed a processing plant for extracting plutonium from irradiated uranium.[46]

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[44]Hore- Lacy, Ian. Nuclear Energy in the 21st Century: World Nuclear University Press, 145, 2010
[45]Ibid
[46]Ibid

As for uranium enrichment technology, it was decided in late 1945 to begin construction of the first gaseous diffusion plant at Verkh-Neyvinsk (later the closed city of Sverdlovsk-44), some 50 kilometres from Yekaterinburg (formerly Sverdlovsk) in the Urals. Special design bureaux were set up at the Leningrad Kirov Metallurgical and Machine-Building Plant and at the Gorky (Nizhny Novgorod) Machine Building Plant. Support was provided by a group of German scientists working at the Sukhumi Physical Technical Institute.[47]

In April 1946 design work on the bomb was shifted to Design Bureau-11 -- a new centre at Sarova some 400 kilometres from Moscow (subsequently the closed city of Arzamas-16). More specialists were brought in to the program including metallurgist Yefim Slavsky who was given the immediate task of producing the very pure graphite Kurchatov needed for his plutonium production pile constructed at Laboratory No. 2 known as F-1. The pile was operated for the first time in December 1946. Support was also given by Laboratory No.3 in Moscow -- now the Institute of Theoretical and Experimental Physics -- which had been working on nuclear reactors.[48]

Work at Arzamas-16 was influenced by foreign intelligence gathering and the first device was based closely on the Nagasaki bomb (a plutonium device). In August 1947 a test site was established near Semipalatinsk in Kazakhstan and was ready for the detonation two years later of the first bomb, RSD-1. Even before this was tested in

[47]Hore- Lacy, Ian. Nuclear Energy in the 21st Century: World Nuclear University Press, 145, 2010
[48]Ibid

August 1949. another group of scientists led by Igor Tamm and including Andrei Sakharov had begun work on a hydrogen bomb.[49]

By the end of World War II, the project predicted and described in detail only five and a half years before in the Frisch-Peierls Memorandum had been brought to partial fruition. and attention could turn to the peaceful and directly beneficial application of nuclear energy[50]. Post-war. weapons development continued on both sides of the "iron curtain". but a new focus was on harnessing the great atomic power. now dramatically (if tragically) demonstrated. for making steam and electricity.

In the course of developing nuclear weapons the Soviet Union and the West had acquired a range of new technologies and scientists realised that the tremendous heat produced in the process could be tapped either for direct use or for generating electricity. It was also clear that this new form of energy would allow development of compact long-lasting power sources which could have various applications. not least for shipping. and especially in submarines.

The first nuclear reactor to produce electricity (albeit a trivial amount) was the small Experimental Breeder reactor (EBR-1) designed and operated by Argonne National Laboratory and sited in Idaho. USA. The reactor started up in December 1951.

[49]Hore- Lacy. Ian. Nuclear Energy in the 21st Century: World Nuclear University Press. 146. 2010
[50]Ibid

In 1953 President Eisenhower proposed his "Atoms for Peace" program, which reoriented significant research effort towards electricity generation and set the course for civil nuclear energy development in the USA.[51]

In the Soviet Union, work was under way at various centres to refine existing reactor designs and develop new ones. The Institute of Physics and Power Engineering (FEI) was set up in May 1946 at the then-closed city of Obninsk, 100 km southwest of Moscow, to develop nuclear power technology.[52] The existing graphite-moderated channel-type plutonium production reactor was modified for heat and electricity generation and in June 1954 the world's first nuclear powered electricity generator began operation at the FEI in Obninsk. The AM-1 (Atom Mirny -- peaceful atom) reactor was water-cooled and graphite-moderated, with a design capacity of 30 MWt or 5 MWe. It was similar in principle to the plutonium production reactors in the closed military cities and served as a prototype for other graphite channel reactor designs including the Chernobyl-type RBMK (reaktor bolshoi moshchnosty kanalny -- high power channel reactor) reactors. AM-1 produced electricity until 1959 and was used until 2000 as a research facility and for the production of isotopes.[53]

Also in the 1950s FEI at Obninsk was developing fast breeder reactors (FBRs) and lead-bismuth reactors for the navy. In April 1955 the BR-1 (bystry reaktor -- fast reactor) fast neutron reactor began operating. It produced no power but led directly to the BR-5 which started up in 1959 with a capacity of 5MWt which was used to do the basic

[51]Hore- Lacy, Ian, Nuclear Energy in the 21st Century: World Nuclear University Press, 146, 2010

[52]Ibid

[53]Ibid

research necessary for designing sodium-cooled FBRs. It was upgraded and modernised in 1973 and then underwent major reconstruction in 1983 to become the BR-10 with a capacity of 8 MWt[54] which is now used to investigate fuel endurance, to study materials and to produce isotopes.

The main US effort was under Admiral Hyman Rickover, which developed the Pressurised Water Reactor (PWR) for naval (particularly submarine) use. The PWR used enriched uranium oxide fuel and was moderated and cooled by ordinary (light) water. The Mark 1 prototype naval reactor started up in March 1953 in Idaho, and the first nuclear-powered submarine, USS Nautilus, was launched in 1954. In 1959 both USA and USSR launched their first nuclear-powered surface vessels.[55]

The Mark 1 reactor led to the US Atomic Energy Commission building the 60 MWe Shippingport demonstration PWR reactor in Pennsylvania, which started up in 1957 and operated until 1982.[56] Since the USA had a virtual monopoly on uranium enrichment in the West, British development took a different tack and resulted in a series of reactors fuelled by natural uranium metal, moderated by graphite, and gas-cooled. The first of these 50 MWe Magnox types, Calder Hall-1, started up in 1956 and ran until 2003. However, after 1963 (and 26 units) no more were commenced. Britain next embraced

[54]Hore- Lacy, Ian, Nuclear Energy in the 21st Century: World Nuclear University Press, 146, 2010

[55]Ibid

[56]Hore- Lacy, Ian, Nuclear Energy in the 21st Century: World Nuclear University Press, 147, 2010

the Advanced Gas-Cooled Reactor (using enriched oxide fuel) before conceding the pragmatic virtues of the PWR design.[57]

2.5.2 NUCLEAR ENERGY GOES COMMERCIAL

In the USA, Westinghouse designed the first fully commercial PWR of 250 MWe, Yankee Rowe, which started up in 1960 and operated to 1992. Meanwhile the boiling water reactor (BWR) was developed by the Argonne National Laboratory, and the first one, Dresden-1 of 250 MWe, designed by General Electric, was started up earlier in 1960. A prototype BWR, Vallecitos, ran from 1957 to 1963. By the end of the 1960s, orders were being placed for PWR and BWR reactor units of more than 1000 MWe.[58]

Canadian reactor development headed down a quite different track, using natural uranium fuel and heavy water as a moderator and coolant. The first unit started up in 1962. This CANDU design continues to be refined.

France started out with a gas-graphite design similar to Magnox and the first reactor started up in 1956. Commercial models operated from 1959. It then settled on three successive generations of standardised PWRs, which was a very cost-effective strategy.[59]

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[57] Hore- Lacy, Ian, Nuclear Energy in the 21st Century: World Nuclear University Press, 147, 2010

[58] Ibid

[59] Ibid

In 1964 the first two Soviet nuclear power plants were commissioned. A 100 MW boiling water graphite channel reactor began operating in Beloyarsk (Urals). In Novovoronezh (Volga region) a new design -- a small (210 MW) pressurised water reactor (PWR) known as a VVER (veda-vodyanoi energetichesky reaktor -- water cooled power reactor) was built.

The first large RBMK (1,000 MW - high-power channel reactor) started up at Sosnovy Bor near Leningrad in 1973 and in the Arctic northwest a VVER with a rated capacity of 440 MW began operating. This was superseded by a 1000 MWe version which became a standard design.[60]

In Kazakhstan the world's first commercial prototype fast neutron reactor (the BN-350) started up in 1972, producing 120 MW of electricity and heat to desalinate Caspian seawater. In the USA, UK, France and Russia a number of experimental fast neutron reactors produced electricity from 1959, the last of these closing in 2009. This left Russia's BN-600 as the only commercial fast reactor.[61]

Around the world, with few exceptions, other countries have chosen light-water designs for their nuclear power programs, so that today 60% of the world capacity is PWR and 21% BWR.[62]

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[60]Hore- Lacy, Ian, Nuclear Energy in the 21st Century: World Nuclear University Press, 147, 2010

[61]Hore- Lacy, Ian, Nuclear Energy in the 21st Century: World Nuclear University Press, 148, 2010

[62]Ibid

From the late 1970s to about 2002 the nuclear power industry suffered some decline and stagnation. Few new reactors were ordered, the number coming on line from mid 1980s little more than matched retirements, though capacity increased by nearly one third and output increased 60% due to capacity plus improved load factors. The share of nuclear in world electricity from mid 1980s was fairly constant at 16-17%. Many reactor orders from the 1970s were cancelled. The uranium price dropped accordingly, and also because of an increase in secondary supplies. Oil companies which had entered the uranium field bailed out, and there was a consolidation of uranium producers. However, by the late 1990s the first of the third-generation reactors was commissioned - Kashiwazaki-Kariwa 6 - a 1350 MWe Advanced BWR, in Japan. This was a sign of the recovery to come.[63]

In the new century several factors have combined to revive the prospects for nuclear power. First is realisation of the scale of projected increased electricity demand worldwide, but particularly in rapidly-developing countries. Secondly is awareness of the importance of energy security, and thirdly is the need to limit carbon emissions due to concern about global warming.

These factors coincide with the availability of a new generation of nuclear power reactors, and in 2004 the first of the late third-generation units was ordered for Finland - a 1600 MWe European PWR (EPR). A similar unit is planned for France as the first of

[63]Hore- Lacy, Ian, Nuclear Energy in the 21st Century: World Nuclear University Press, 148, 2010

a full fleet replacement there. In the USA the 2005 Energy Policy Act provided incentives for establishing new-generation power reactors there.

But plans in Europe and North America are overshadowed by those in China, India, Japan and South Korea. China alone plans a sixfold increase in nuclear power capacity by 2020, and has more than one hundred further large units proposed and backed by credible political determination and popular support. A large portion of these are the latest western design, expedited by modular construction. The history of nuclear power thus starts with science in Europe, blossoms in UK and USA with the latter's technological might, languishes for a few decades, then has a new growth spurt in east Asia.

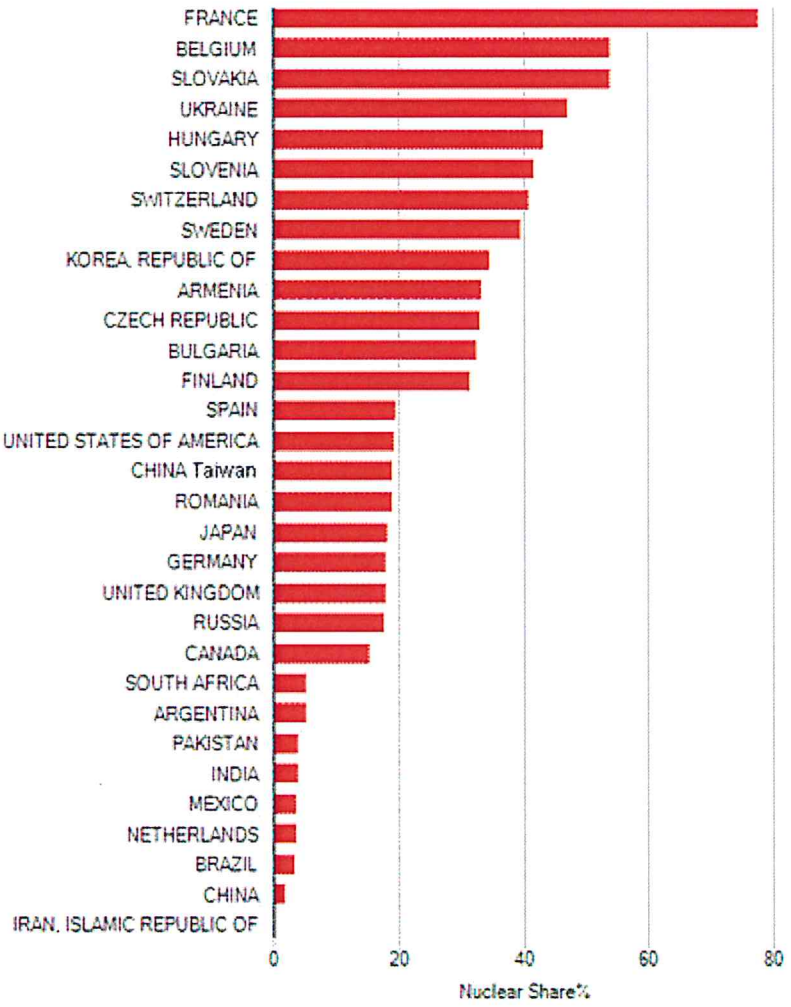

Table - 1: Nuclear share in electricity generation, 2011 (IAEA 2012, modified)[64]

[64] *Nuclear Power Plants Worldwide.* (2013, 1 18). available on 11 10, 2013 available at European Nuclear Society: http://www.euronuclear.org/1-information/map-worldwide.htm

3. NUCLEAR ENERGY AND NUCLEAR WEAPONS IN INTERNATIONAL LAW

This part will be focused on the International Agreements, Treaties and Conventions. It is essential to underline the effect of International Law on Nuclear Energy and Nuclear Weapons. Those documents might be called as the outcomes of the Nuclear Energy Politics. Analyses of those legal documents will not be focused on what is the issue of those treaties or agreements. The main focus will be why and how International Law on Nuclear Energy shaped from a critical and realist perspective.

International law's emergence is a part of liberal modernity in the latter half of the nineteenth century.[65] "Modernity" has meant that it has been animated by a progressive and universalistic spirit, firm confidence in the ability of liberal political institutions to transform the world into a democratic and rule - governed Kantian Völkerstaat. In this sense it is likely that many other aspects of modernity, the profession of international law has in recent years been bogged down in fruitless and repetitive forms of thinking about the international world; bureaucratic etatism on the one hand imperial or nostalgic humanism on the other.[66]

In the era of globalization, aspects of globalization that seem to advance the cosmopolitan promise in Kant's famous 1795 essay.[67] Few of the international lawyers think that also commit to support the policies of the World Bank or the World Trade

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[65]M. Koskenniemi, The GentleCivilizer of Nations, The Rise and Fall of International Law 1870 - 1960 (Cambridge Universitypress, 2001)

[66]M. Koskenniemi, What Should International Lawyers Learn from Karl Marx? International Law on the Left, Editedby Susan Marks (Cambridge UniversityPress 2008)

[67]İ. Kant, 'Perpetual Peace: A PhilosophicalSketch' in Kant, PoliticalWritings, HansReiss (ed.), (Cambridge: Cambridge UniversityPress, 2nd edn, 1991), p.93

Organization, humanitarian intervention or the fight agaisnt terrorism. So the question is: how to distinguish between commitment to universalism and the policies of powerful international actors constantly invoking the universal so as to justify their particular agendas.[68] In fact, it seems that those countries which are experiencing this dilemma usually bind themselves with the chains of the International Law which is shaped according to the interests of the powerful international actors. Consequences of this issue are reflected to the International Law on Nuclear Energy as well. Next part will focus on the details of NPT(Non-proliferation Treaty).

Nuclear weapons have a vital role in the international community, identifying the attitude of states and their actions to each other, since the beginning of the Cold War. Throughout the twentieth-century, nuclear weapons became weak; their range and power have both increased, bringing the potential for greater destruction to the earth. Being submitted by the USA, Atoms for Peace project was accepted at the (UN) United Nations General Assembly in November 1954. For the global control of atomic power, which is to be used for peace purposes, International Atomic Energy Agency-IAEA was established under the UN, in 1957.

In 1958, in a report (Director of Central Intelligence, NILE 100-2-58 1, July 1958), prepared by the Office of United States Director of Central Intelligence, it was predetermined that unless necessary international measures were taken, at least 16 countries running civil nuclear plantss were also to produce and try nuclear weapons. According to this report, in 1961, the US President John Fitzgerald Kennedy, by setting

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[68]M. Koskenniemi, What Should International Lawyers Learn from Karl Marx? International Law on theLeft, Edited by Susan Marks (Cambridge UniversityPress 2008)

up a commission named 'Arms Control and Disarmament Agency',started and international dialogue for both Non-Proliferation Treaty–NPT and Comprehensive Nuclear Test Ban Treaty–CTBT to enter into force.

In order to restrict spreading of nuclear weapons, the Non-Proliferation Treaty (NPT) in 1968 is adopted internationally, which calls for the secession of the nuclear arms race and abandonment of nuclear weapons.

In 1968, NPT presented for signature, the Treaty entered into force in 1970. The treaty was extended indefinitely on 11 may 1995. Five permenant members of the United Nations Security Council were recognized as nuclear weapon states: the United States, Russia, The United Kingdom, France and China. Total parties which have joined the Treaty were 190.

There is a clear distinction between the states which have nuclear weapons and which have not nuclear weapons, parties of NPT which does not have nuclear weapons are expected not to have any kind of nuclear weapons. In other hand, states which have nuclear weapons are expected to stop producing nuclear weapons and they are binded for complete disarmament. [69]

The Non-Proliferation Treaty is one of the most important agreements binding agreement which can restrict and reduce spreading and using of nuclear weapons globally and aims abandonment of usage in the future. A latest plan in the US to start appropriate research in the field of nuclear earth-penetrating weapons is a strong challenge to the treaty; it conflicts with the basic provisions of treaty, namely Article VI, which follows as:

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[69] 2005 Review Conference of the Parties to the Treaty on the Non-Profilation of Nuclear Weapons (NPT), 2-27 2005, New York. Available at www.un.org

"Each of the Parties to the Treaty undertakes to pursue negotiations in good faith on effective measures relating to cessation of the nuclear arms race at an early date and to nuclear disarmament, and on a Treaty on general and complete disarmament under strict and effective international control"[70]

It could be expected that if US manages developing such kind of weapons, other countries -either nuclear or non-nuclear bearing- would feel the necessity of those weapons also, in order to protect their national interests and sovereignty. The goal of NPT and, especially Article VI, is to stop such races for the good of the humanity, because nuclear weapons are dangerous and pose threat to the population of the globe.[1]However, this suggested research could reduce the output of nuclear weapons, it can also supply a stage to continue racing internationally, in violation of the NPT.[71]

As a testament to the Treaty's sginificance, more countries have certified the NPT than any othher arms limitation and disarmament agreement. There are four countries(Israel, India, Pakistan and North Korea) which are known to possess nuclear weapons and also three of them(India, Pakistan and North Korea) openly tested and declared that they possess nuclear weapons. Israel has a different position in which Israel State has a strict closure about its own nuclear weapons program. In April 1995, 178 countries assembled in New York and discussed the future of the agreement. NWS was hoping to persuade those who are party to NPT to protract the agreement unconditionally and indefinitely. However, many countries and observers asserted that the 4th article of NPT, which

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[70]2005 Review Conference of the Parties to the Treaty on the Non-Profilation of Nuclear Weapons (NPT), 2-27 2005, New York. Available at www.un.org

[71]Nikitin, Boris S. (2010). "International Law and Nuclear Weapons: Does the Continued Development of Advanced Nuclear Weapons Violate International Law?" *Student Pulse*, 2(01). Retrieved from: <http://www.studentpulse.com/a?id=140>

introduced the obligation for the NWS to impose disarmament at a large extent, is not executed. Following the negotiations which started in 1995 and continued until 2000, NPT was indefinitely protracted on the approval of 189 countries as an international disarmament agreement with the maximum number of participants ever. India, Israel and Pakistan have not signed this agreement so far. North Korea once became a party to the NPT in 1985 but never came into compliance. In 2003, North Korea formally announced its withdrawal. [72]

The NPT consists of a preamble and eleven articles. Even not expressed anywhere in the Treaty, it is interpreted as a three-pillar system which aims the protect the balance among non-proliferation, disarmament and the the right to peacefully use nuclear technology[73]

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[72] "Nuclear Non-Proliferation Treaty (NPT)". *Defense Treaty Inspection Readiness Program - United States Department of Defense*. Retrieved 2013-06-19.

[73]Ambassador Sudjadnan Parnohadiningrat, 26 April 2004, United Nations, New York,Third Session of the Preparatory Committee for the 2005 Review Conference of the Parties to the Treaty on the Non-Proliferation of Nuclear Weapons, furnished by thePermanent Mission of the Republic of Indonesia to the United Nations (indonesiamission-ny.org)

4. POLITICS OF NUCLEAR ENERGY IN REGIONAL DIMENSION

4.1 EUROPEAN UNION

The European Union is predominantly comprised of industrially advanced countries. Accordingly, the energy needs of the member states gradually increase day by day. A considerable part of energy consumption of EU states are mainly seen in transportation and industry sectors. The European Union, currently, imports 50% of its energy need and if necessary precautions are not taken this rate is estimated to increase to 70% between the years 2020 and 2030.[74] This dependency will cause the EU to be more dependent on other countries and this case, consequently, forms a source of concern for EU states. The rate of energy import in general imports is 6%. The European Union imports 40% of its petroleum from Middle East countries[75] and 40% of its natural gas from Russia.[76] In case the relations of the EU with the Middle East countries and Russia worsen, the flow of energy will be cut off and the EU will be faced with a significant energy deficit. For the EU to be dependent on abroad in terms of energy established its weak spot. The excessive increase in petroleum prices during the 1st Gulf War clearly proves the aforesaid.[77]

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[74]International Conference for Renewable Energies European Commission Side (by Gonzalez Finat) Bonn, June 2004

[75]EU Strategy in the Middle East: News Analysis, People's Daily Online, 26 October 2004

[76]Berris Ekinci, The Role of Turkey Epicentre of Energy Routes, in the European Energy Security, s.2 Conference on Natural Gas Transit and Storage in Southeast Europe, President Hotel, İstanbul, 31 May-1 June 2002.

[77]See. "On the Consequences of the War in Iraq for Energy and Transport", Commission of the European Communities, Brussels, 26.03.2003, COM (2003) 164 Final.

Crude oil and petroleum products take an important place in satisfying the energy need of the Union. In order to prevent the possible future energy crises all member states are obliged to store certain amount of crude oil and refined petroleum. The Directives execute strict supervision on member states regarding the stocking. All members which fall within the territories of the EU are obliged to keep in stock which will be enough for 90 days[78] (This period will be increased to 120 days in 2007). There is a Commission which monitors the current stocks of the states and reports these to the Council. In brief, the European Union is substantially concerned about a possible energy crises and therefore in order to avoid those kind of situations it is taking strict measures. In fact, it is trying to put alternative energy projects such as nuclear, sun, wind and bio-energy in action for future energy safety and more undisturbed days.[79]

Nuclear energy and nuclear energy projects are of great importance in terms of preventing energy crises which will be harmful for EU economy. As it has been in every phase of history today EU states places great emphasis on "national independency" and they do not wish to be dependent on other countries. For that reason some European countries prefer to redeem this deficiency with nuclear energy rather than to be dependent on the Middle East and Russia. However, there is not a consensus which has been established between states. While certain states are substantially dependent on nuclear energy others completely refuse the use of nuclear energy.

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[78]Valeria Constantini ve Francesco Gracceva, Oil security Short and Long Term Policies, Center for European Policy Studies, No:7 Mart 2004, s.7

[79]European Commission. (2012, 7). *The European Union Explained.* Available on 6 18, 2013 available at European Union: http://europa.eu/pol/ener/flipbook/en/files/energy.pdf

There are 132 operational nuclear power plants in the EU. While some of the reactor are being decommissioned, working lives of others are being extended and several new units are planned or under construction. Besides the power reactors, there are a full range of fuel cycle plants (ranging from enrichment to waste storage and recycling) which are in operation in Europe. Each Member State is responsible for deciding on its preferred choice of energy mix. Today, a total of 14 EU Member States out of 27 use nuclear energy for power generation. One third of all electricity in the EU is currently being generated from nuclear energy.

The EU and its people places great emphasis on nuclear safety. National economies can be potentially destructed as a result of major nuclear accident. For that reason, the avoidance of occurrence of any nuclear accidents in the European Union by ensuring the highest possible quality of regulatory oversight and standards of nuclear safety in each and every EU Member State is of great importance for the European society and the economy. The aftermath of the Fukushima nuclear accident of March 2011 restored the political and public concern regarding the necessary measures to minimise risk and guarantee the most robust levels of nuclear safety.

4.1.1 EURATOM

European Atomic Energy Community was established after the Treaty of Rome was signed in 1957. This treaty is one of the founding treaties of the European Union. The general task of EURATOM is to ensure the development of nuclear technology and ensure all humanity is safely making use of this technology. The Community tries to

prevent the use of nuclear materials for military purposes and allows for them to be used for only peaceful purposes.[80]

The main purpose of EURATOM is to encourage the nuclear researches to be conducted for only peaceful purposes and to prevent the uncontrolled proliferation of the nuclear technology knowledge. It also undertakes other responsibilities in addition to the aforesaid. For example, the Community designates the security standards for the preservation of worker health and inspects whether these are implemented. For example the 96/92 numbered standards specify the most basic standards for worker health. The Community places great emphasis on the pursuance of nuclear wastes in use. For example, member states are obliged to inform the Commission during the disposal of their own radioactive substances.

EURATOM supports the investments and programmes carried out within the EU towards the development of nuclear energy. The use of nuclear energy for reasonable, rational and peaceful purposes is supported by EURATOM. All member states have equal rights in possessing nuclear power.[81] Member States, if they wish, may provide nuclear fuel from EURATOM. There are no "privileged" member amongst member states. The operation of the Community is to ensure the safety of nuclear materials. Strict security measures are implemented in order to prevent the use of nuclear materials for military purposes. For example, these observations are carried out by a group of inspectors comprised of 300 inspectors. The inspectors are equipped with broad

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[80]Euroatom Conference "After 45 Years of Nuclear Promotion", European Parliament, Brussels, Belgium, 12 September 2002.

[81]European Union. (2010, 3 30). *Treaty establishing the European Atomic Energy Community.* Available on 5 20, 2013 available at Eur-Lex: http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:C:2010:084:0001:0112:EN:PDF

authorities, they can access to the desired place, information and individuals whenever they want. The policies of EURATOM and IAEA are intercompatible and demonstrate a parallelism. After the Commission discusses the conventions, it finalises the treaties in accordance with the directives published by the Council. The finalisation of the conventions depend on the approval of the Commission. Today, the cooperation with countries such as America, Australia and Canada in the field of nuclear are carried out with these conventions.[82] However, in this day and age, issues such as nuclear power plant safety, storage of radioactive wastes and proliferation of nuclear technology are gradually gaining importance.

Together with the disintegration of the Soviet Union, new states both in Eastern Europe and Middle Asia emerged. Some of these states possess primitive nuclear power plants, left from the Soviet era and are deprived of the technology and financial potential to provide the maintenance and safety of these plants. For that reason these primitive power plants will continue to pose a threat both for humans and nature if they are not safely detached under the supervision of nuclear experts. The European Union is closely interested in these nuclear power plants and power plants which may potentially pose a threat due to the importance layed on the environment and enhancement of renewable energy resources by the EU.

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[82] Gerrard Quille, a Transatlantic Approach to Non-Proliferation and Disarmament, European Security Review, No: 16, February 2003.

4.2 MIDDLE EAST AND NORTH AFRICA

4.2.1 ISRAEL

The interest of Israel towards nuclear programmes dates back to 1948 when the state was established. The newly established Weizmann Institute of Science began to support a nuclear research, in 1949, under the guidance of the scientist and a personal friend of the Prime Minister David Ben-Gurion.[83] Erns David Bergmann. Bergmann became the first Chairman in 1952 of the secretly established Israel Atomic Energy Commission.

From the beginning, Israel adopted a nuclear uncertainty policy. Very little information regarding the nature and size of the nuclear programme has been approved by official authorities. Just as the evaluation presented in this report, many evaluations are based on foreign sources.

As a consequence of the nuclear collaboration in the early 50s and negotiations with France, a treaty was concluded in 1957 for the establishment of Dimona large scale nuclear plant. In this treaty it was decided that France would establish a 24 MW reactor (however it is claimed that the cooling systems and waste facilities were designed to generate three times more power and the protocols which were not written down, on the other hand, assert that an agreement was made on a chemical material reprocessing plant).[84]

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[83]Cohen, Avner, Israel and Chemical/Biological Weapons: History, Deterrence and Arms Control, The Non-Proliferation Review / Fall - Winter 2001, 27.

[84]Warner D. Farr, LTC, U.S. Army, The Third Temple's Holy Of Holies: Israel's Nuclear Weapons. Available onSeptember 1999.available at http://www.au.af.mil/au/awc/awcgate/cpc-pubs/farr.htm

The reactor began its preliminary operation in 1964 and it is considered that in the early 70s, the thermal capacity of the reactor considerably increased and its capacity three or four times more than its currrent 24 MW capacity.[85] It is assumed that the activities of the plutonium extraction facility associated with the reactor were initiated right after the reactor began operating.

The reprocessing facility has the annual capacity to produce approximately 20-40 kg plutonium oriented towards weapon production, this figure is enough for the annual production of 5-warheads. Dimona has been operating outside fo the international security audit from its establishment.[86]

The Nahal Soreq Nuclear Research Center, located near Beersheba which is situated south of Tel Aviv began its operations in 1955. The 5 MW research reactor was completed in 1960.[87] In contrary to Dimona this plant operates in accordance with the audit treaty of International Atomic Energy Agency.

According to information received from foreign sources, the nuclear infrastructure of Israel includes many other factories and facilities towards the production of strategic weapon. Among these are Tiroş and Eilabun nuclear storage facility; advanced technology weapons, R&D establishment, Rafael, of the Ministry of Defence which produce missile and warheads and an underground base, "Bor" (Pit) of the Ministry of Defence.[88] The Israeli authorities gather in Bor in order to manage the war during the crisis.

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[85]Warner D. Farr, LTC, U.S. Army, The Third Temple's Holy Of Holies: Israel's Nuclear Weapons. Available onSeptember 1999.available at http://www.au.af.mil/au/awc/awcgate/cpc-pubs/farr.htm

[86]Ibid

[87]*Weapons of Mass Destruction (WMD)*. (1995, 4 6). Available on 5 17, 2013 available at Global Security : http://www.globalsecurity.org/wmd/world/israel/soreq.htm

[88]Cordesman, Anthony H. Israeli Weapons of Mass Destruction - An Overview, Center for Strategic and International Studies, 1st Working Draft, June 2, 2008, 8

The facilities where the missiles are stored are in Hirbat Zachariah. According to the photographs recently recovered from satellite around 100 Jericho-I and Jericho-II are situated in the said location. Another location where the missiles are situated is Be'er Yaakov, where the assembly of Jericho and Arrow missles and Sahvit lauch vehicle was made. Palmakhim Air Base is the most important research and development facility of Israeli Defence Forces. Missiles and rockets are assemblied and tested in this air base. Tel Nof, which is one of the biggest air bases in Israel, contains the planes with the capacity of transporting nuclear weapon and is only a couple of miles away from Tiroş, nuclear weapon storage facility and missile base Hirbat Zachariah .[89] It is assumed that the abovementioned planes are kept ready for 24 hours.

Israel signed but has not approved the Treaty on the Non-Proliferation of Nuclear Wepons and Biological Weapons Convention, Chemical Weapons Convention and Comprehensive Test Ban Treaty.

Israel is a member of IAEA and participates in the annual meetings of the Agency. Throughout the last 14 years Israel attended to the consesus regarding "the Implementation of IAEA audits in Middle East". However, Israel stopped attending to security audit consensus after the diplomatic pressure imposed on the matter of acting on "Nuclear Capacity of Israel and Threats Inclined" in general council which gathered in 2006.

Israel every year casts vote in favor of the establishment of "a region in Middle East purified from nuclear weapons" in the UN General Assembly. However Israel casts a negative vote for the resolution regarding the "risk of proliferation of nuclear weapons in Middle East". Even

[89]Cordesman, Anthony H. Israeli Weapons of Mass Destruction - An Overview, Center for Strategic and International Studies, 1st Working Draft, June 2, 2008, 8

though the Israeli Government never officially accepted to have carried out a nuclear weapon programme, the international community, since the 60s, has been aware of the fact that the nuclear programme of Israel is for military purposes.

All of the facilities in nuclear programme of Israel, except Nuclear Research Center in Nahal Soreq are military; Israel does not have a nuclear energy programme. Dimona is the center of the military programme: Dimona reactor provides the used/unused fuel from which plutonium is extracted/decompounded. Plutonium is put through the aforementioned processes in the reprocessing centers situated in two locations and afterwards is converted plutonium metal for the launch mechanism necessary for a nuclear weapon. If the energy capacity is increased to 75 MW with the changes made to the reactor in the 70s, the plutonium production should be around 15 to 20 kg per activity year. According to the estimations based on the remarksof Vannunu, the average weekly production is 1.2 kilogram; this would be enough to annually produce 4-12 nuclear weapons.[90]

The Internation Atomic Energy Agency requested Israel to open its nuclear facilities for the IAEA security audits in 1981, however it was rejected. For that reason the Dimona facility (reactor and plutonium reprocessing center) is still not subject to audit.[91]

Today, even though the size and content of Israel's nuclear stock is unclear, it is regarded that the explosive force of its nuclear weapons are regarded to have different ranges. Based on the

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[90]Vanunu, M. (2005). *Vanunu Mordechai J.C.* Available on 6 15, 2013 available at Vanunu Mordechai J.C: http://www.vanunu.com/

[91]Vanunu, M. (2007). *Vanunu Mordechai J.C.*available on 6 15, 2013 available at Vanunu Mordechai J.C: http://www.vanunu.com/

production estimations of USA Central Intelligence Group in the late 90s, it is estimated that Israel possesses 75 to 130 weapons.[92]

The most important reasons which lays behind Israel's choice of nuclear weapons is to possess a "last resort" weapon. The Israeli defence institutions initiated a systematic defence planning in 1966 which gave birth to the term four "red lines". In case these four "red lines" are crossed, Israel would consider of using nuclear weapons. These four red lines are;

— The incursion of Arabian soldiers to the residential areas of Israel within the borders established after 1949;

— The annihilation of Israeli Air Forces;

— Organising large scale and destructive air assults to Israel or use of chemical or biological weapons;

— Use of nuclear weapons against Israel.

Israel possessing nuclear weapons became a secret known by all in 1970, observers claim that the nuclear alarm status of Israel in 1973 was the second in its history. In addition, it was reported that Israel went into full nuclear alarm status when the USA was bombing Iraq during its 1991 Desert Storm operation and Iraq was sending SCUD missiles to Israel. There has not been a change in the official nuclear policy of Israel since the 1960s; since then Israel has made its announcement that "it will not be the first country to bring nuclear weapons to Middle East" but has avoided to clarify the meanings of the terms "bring" and "nuclear weapons" within this context. The decision making mechanisms and citizens of Israel are supporting Israel's policy and this support is associatedwith prevalence of the view of Israel to possess nuclear weapons in order to continue its existence as an independent country.

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[92]Vanunu, M. (2005). *Vanunu Mordechai J.C.*available on 6 15, 2013 available at Vanunu Mordechai J.C: http://www.vanunu.com/

4.2.2 IRAN

Following the speech of the President of the USA in 1953 entitled 'Atoms for Peace' at the UN General Assembly the USA's previously secret civil nuclear studies was declared to the whole world. After this date in history, the American government established small scaled research reactors and provided the technological and scientific infrastructure for to operate these reactors to countries which America deemed friendly and allied. Within the framework of these incentives in 1967, one research reactor was established each in Iran, Turkey and Pakistan by the USA. However, prior to this date, in 1957 within the scope of 'Atoms for Peace Programme', a collaboration treaty between Iran and the USA regarding the use of nuclear energy for civil purposes was signed and in 1959 the Tehran Nuclear Research Center was established.[93]

In 1967, the first 5 MW nuclear research reactor, established in Tehran University by the AMF (American Machine and Foundary) with the support of the USA had a capacity to produce 600 grammes of plutonium a year which will be able to provide the needed amount of fuel. Following this process, Iran signed the 'Non-Proliferation Treaty' in 1968 and in 1970 it was ratified by the assembly. Iran, who signed the treaty, gained the right to carry out nuclear activities, produce and make research, procure the necessary materials and technology with the right entitled by the 4th of the treaty.[94]

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[93] Mohammad Sahimi, 'Iran's Nuclear Program-Part I: Its History', *Payvand News*, 2 October 2003.

[94] NPT 4th Article

The support of the USA and report of the Stanford Research Institute triggered the nuclear activities in Iran.[95] According to this report; Iran will be in need of a 20.000 MW electricity capacity by the year 1990.[96] Another important matter which must be recalled is the change of the Gulf policy of the USA after President Nixon took over the Oval Office and in line with that policy Iran becoming a country of vital importance for America's interests. Nixon desired to increase the power of the Shah in order to reduce the Soviet dominance in the region and create a deterrent power against the Soviet. Iran, within this period, became one of the three cornerstone pillars of the USA together with Egypt and Israel.[97] On the other hand, the 1973 Arab-Israeli Conflict and the petroleum crises which came after caused an outburst in currency reserves of Iran who is a petroleum exporter and an extraordinary uptrend in Iranian economy. The Iranian Shah, who was well aware of the situation, after deciding to expand the nuclear programme, resolved the initiation of a project for 23.000 MW nuclear power capacity until the year 2000. For the purpose of immediately initiating the project in March 1975 the Atomic Energy Organisation of Iran was established.[98] Following the aforementioned developments, European and American companies began to compete with each other to be partners of the highly profitable Iranian nuclear programme.

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[95]Mustafa Kibaroğlu, 'Iran's Nuclear Ambitions from a Historical Perspective and the Attitude of the West', *Middle Eastern Studies*, Vol: 43, No: 2, Mart 2007, s. 225-233

[96]Mohammad Sahimi, 'Iran's Nuclear Program-Part I: Its History', *Payvand News*, 2 Ekim 2003.

[97]Mustafa Kibaroğlu, 'Good for the Shah, Banned for the Mullahs: The West and Iran's Quest for Nuclear Power', *Middle East Journal*, Vol. 60, No: 2, Spring 2006, s. 213

[98]M. Ghannadi Maragheh, 'Atomic Energy Organization of Iran', *World Nuclear Association Annual Symposium*, London, 4-6 September 2002

4.2.2.1 IRANIAN NUCLEAR PROGRAMME AFTER THE 1979 ISLAMIC REVOLUTION

As it was expressed by the Iranian Shah, the balances in the world can slide towards an unpredictable direction because the crown of the Iranian Shah, who was very confident about his armed forces was overthrown not by the regional states but by the hands of his people. As a consequence the nuclear programme, which was developed and gained momentum in 10 years, and all of the relations established in parallel with the said programme was interrupted with the Iranian revolution. Companies connected to the project left Iran as a result of the Iran-Iraq war which broke out after just one year of the revolution. After all Ayetullah Humeyni already stopped the nuclear studies and demanded that the facilities are not to be completed with the thought that the studies will create dependency on foreign countries.[99] However, it is best to remind that 90% of the reactor named Buşehr-1 was completed and 60% of its materials were established on the date the companies left the country. The 50% of the construction of Buşehr-2 reactor was also completed. However the distance covered during the Shah period entered in standstill process with Humeyni and throughout the Iran – Iraq war, the nuclear facilities in the province of Buşehr of Iraq were seriously damaged as they were bombed six times.[100]

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[99] Kibaroğlu, 'Good for Shah, Banned for Mullahs...' p. 216

[100] Farhang Rajaee. *The Iran-Iraq war: The Politics of Aggression*. (Gainesville: University Press of Florida, 1993), p. 224-225

The Iran-Iraq war, continuing between the years 1980-1988 and the heavy economic tall that came with the war considerably increased the need of electricity power of Iran.[101] On the other, during the war, Iran comprehended the importance of possessing advance technology and started to consider the advantages that the nuclear technology will create. As a result of the said situation, the Iranian Islamic regime once again lunged a nuclear energy initiative after Haşemi Rafsanjani, who was the President then, convinced the religious leader in 1989. The Iran-Iraq war was acutely effective for the change of the said policy, as it is expressed above. Iran began concentratedly to work to increase its military power and capacity after 1989. The fact that Iran's economy was negatively affected during the war and its security concerns paved the way for adopting this decision.[102] Iran, in order to be more powerful and independent, desired to have its own nuclear facilities. On the other hand, while its population was on the increase, the production of petroleum was decreasing and the domestic consumption rates were considerably rising. As a matter of fact, it will be alleged that the justification that Iran will save 190 million barrel of crude oil a year is behind its announcement regarding its goal for a 20.000 MW nuclear electricity in the coming years.[103] One of the most important justifications of Islamic Republic of Iran for the nuclear programme is the fact that the use of petroleum which will be exported and enter the country as foreign currency, is damaging the country's interests if used domestically. If the nuclear programme is developed and nuclear fuel technology is achieved, nuclear energy will be

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[101] Farhang Rajaee. *The Iran-Iraq war: The Politics of Aggression*. (Gainesville: University Press of Florida, 1993), p. 224-225

[102] Hooshang Amirahmadi-Nader Entessar (eds.), *Reconstruction and Regional Diplomacy in the Persian Gulf*, (London: Routledge, 1992), p. 65-106,

[103] M. Javad Zarif, 'Tackling the Iran-US Crisis', *Journal of International Affairs*, Vol: 60, No: 2, Spring-Summer 2007, p. 78

used instead of consuming fossil resources and fossil fuels will be exported.[104] Deriving from this goal, the Islamic Republic, in 1984, requested form France and Germany to complete the facilities left unfinished. However the USA, who severed all ties with the current Iranian governemnt, prevented this initiative by oppressing both countries.

USA's Approach Towards Iranian Nuclear Programme After the Revolution

The USA – Iran relations was teared apart from the moment of occupancy of the US Embassy in Tahran by Iranian students and holding its employees as hostages for 444 days after the Iranian Islamic Revolution and the relation between the two country has not reached its normal levels. Therefore, the USA has tried to sabotage the attempts of Iran towards nuclear programme as it considered Iran as an hostile country following the incident. As the oppression it try to apply on China and Russia did not come through, the USA began to allege that Iran was aiming to produce nuclear weapons and from that moment on, it expressed the said allegation in different periods of time.

The first critical allegation regarding the matter was stated in the report prepared by the American Intelligence Agency, CIA, in 2000.[105] According to this report, Iran reached the capacity to produce nuclear weapons in its current situation. The USA's aforementioned allegation has continued to exist up to this day as it became more evident in the Iranian nuclear crises which will outburst two years later and moreover its rightness concerning the matter was proved in its own way.

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[104] Roger Stern, 'The Iranian Petroleum Crisis and United States National Security', *PNAS*, Vol: 104, No: 1, 2 January 2007, p. 377-378

[105] James Risen - Judith Miller, 'CIA Tells Clinton an Iranian A-Bomb Can't be Ruled Out', *New York Times*, 17 January 2000.

4.3 ARAB SPRING AND THE NUCLEAR ENERGY POLITICS

Not only historical facts and events are enough to explain nuclear energy politics. A contemporary case "Arab Spring" consists many variables. Energy politics maybe the most important and crucial issue while examining the "Arab Spring" but it was overestimated by mainstream media and other political actors. In this part, Arab Spring will be evaluated from a energy centric perspective.

Protests against the Tunisian Government started on 18th of December 2010 in the streets of Tunisia, at that time this was seemed to be a reaction of Tunisian people against the Tunisian government because of the poor living conditions, corruption and freedom problems (especially freedom of speech)[106]. Those problems are common for the countries of all that region which is called Middle East and North Africa (MENA). According to the mainstream media people of Tunisia were right and their resistance against the government was just. Tunisia was shown as a good example for the nations which are living in the same circumstances. Actually they were all pointing out the MENA countries. As expected Egypt, Libya, Yemen, Syria and Bahrain faced with similar issues. Some of them called as uprisings, some of them called as civil war and some of them were called as so called revolutions. The "spring" of democratization and freedom caused the death of 29.000 people[107].

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[106]Ryan, Yasmine. "Tunisia's bitter cyberwar". Al Jazeera English. Available at http://english.aljazeera.net/indepth/features/2011/01/20111614145839362.html. Retrieved 14 January 2011.

[107]*İşte Arap Baharının Bilançosu*. (2011, 10 4).Available on 9 25, 2013 available at HaberTürk: http://www.haberturk.com/dunya/haber/675972-iste-arap-baharinin-bilancosu

Maybe the most crucial change and conflict happened in Libya Case in Arab Spring. Civil war between the president Gaddafi and opposition forces ended up with the overthrown and murder of Gaddafi. This paper will discuss the reasons and results of those incidents. Before getting into the History of Libya and evaluating the incidents in Arab Spring, it would be necessary to give basic information about Libya to understand what was exactly going on in there and what are the interests of clashing parties. Not only interests of parties, what can global economy gain from this country should be seen between the numbers.

Libya is located in the North Africa, bordering the Mediterranean Sea, between Egypt, Tunisia, and Algeria, southern border with Chad, Niger, and Sudan. Libyan territory is 1,759,540 sq. km. Libya's nationality is called as Libyans (noun and adjective) and its population is 6,461,454. (July 2010 est.). Ethnic groups and their percentages in Libya are Berber and Arab 97%; other 3% (includes Greeks, Maltese, Italians, Egyptians, Pakistanis, Turks, Indians, and Tunisians). Religious distribution: Sunni Muslim 97%, other 3%. Languages: Arabic is the primary language. English and Italian are understood in major cities.

4.3.1 LIBYA ECONOMY

Real GDP (2009 est.): $85.04 billion.

GDP per capita (PPP, 2009 est.): $13,400.

Real GDP growth rate (2009 est.): -0.7%.

Natural resources: Petroleum, natural gas, gypsum.

Agriculture: Products--wheat, barley, olives, dates, citrus, vegetables, peanuts, soybeans; cattle; approximately 75% of Libya's food is imported.

Industry: Types--petroleum, food processing, textiles, handicrafts, cement.

Trade: Exports (2009 est.)--$34.24 billion: crude oil, refined petroleum products, natural gas, chemicals. Major markets (2009 est.)--Italy (37.65%), Germany (10.11%), Spain (7.94%), France (8.44%), Switzerland (5.93%), U.S. (5.27%). Imports (2009 est.)--$22.11 billion: machinery, transport equipment, food, manufactured goods, consumer products, semi-finished goods. Major suppliers (2009)--Italy (18.9%), China (10.54%), Turkey (9.92%), Germany (9.78%), Tunisia (5.25%), South Korea (4.02%)[108].

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[108] *Libya (07/07/11).* (2011, 7 7).Available on 10 20, 2012 available at U.S Department of State: http://www.state.gov/outofdate/bgn/libya/185547.htm#

4.C.2 BEFORE THE ARAB SPRING: GADDAFI'S LIBYA

This part will include a brief summary of Libyan history which covers the time period between 1951 and 2011. 1951 was the year in which Libya gained its independence all after the years Libya was a colony of Italy.

King Idris became the leader and founder of independent Libya with the help of UN resolution for Libya. Idris founded a constitutional monarchy and he is known as the first and only monarch of Libya until he was overthrown by a military coup which was led by Muammar Gaddafi on 1 September 1969[109]. The new regime, headed by the Revolutionary Command Council (RCC), abolished the monarchy and proclaimed the new Libyan Arab Republic. New council's motto was freedom, socialism and unity. It pledged itself to remedy "backwardness," take an active role in the Palestinian cause, promote Arab unity, and encourage domestic policies based on social justice, non-exploitation, and an equitable distribution of wealth[110]. At this point it is obvious that the values which were based on the Gaddafi leaded Libya, were totally against the global capitalism. Capitalism needs globalization instead of domestic policies, capitalism needs competition to grow larger instead of having social justice, capital

[109]Chronology of International Events and Documents, Royal Institute of International Affairs. Vol. 7, No. 8 (5-18 April 1951), pp. 213-244

[110]Affairs, B. o. (2013, 1 15). *U.S Relations with Libya*.Available on 5 17, 2013 available at U.S Departmant of State: http://www.state.gov/r/pa/ei/bgn/5425.htm

owners absolutely need exploitation and if wealth is distributed equally, capitalism will be dead. Gaddafi could not foresee what is coming at that time for sure but those ideals meant to be the beginning of the end for him. Aggressive stance of the hegemonic forces against Libya during the Gaddafi leadership continued until he was overthrown in 2011. There were various reasons for this aggressive standings but the main reason was obviously the main principles of Revolutionary Command Council which were clashing the hegemonic interests of global powers and rich oil and gas reserves.

Gaddafi as a socialist and revolutionary leader, closed the US and British bases in Libya just after 1 year he came to power. Those bases could be called as imperialist statues of global hegemonic forces of the world[111]. Gaddafi was always in a conflict against those forces of hegemony in his region because especially US used to confront Gaddafi at every time he tries to enlarge Libya's area of effect[112]. It was not a coincidence that US was blaming Libya for supporting terrorist actions in Europe in the 1980's[113] and Libya was also blamed for building chemical plants to product chemical weapons too[114].

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[111] *BRITAIN TO LEAVE LIBYA BY MARCH; Discloses Agreement on Withdrawal of Forces.* (1970, 3 31).Available on 5 15, 2013 available at The New York Times: http://select.nytimes.com/gst/abstract.html?res=F40D14FD345F127A93C6A81789D95F4D8685F9&scp=8&sq=military+base+british+libya&st=p

[112] Gwertzman, B. (1981, 8 20). *U.S. REPORTS SHOOTING DOWN 2 LIBYA JETS THAT ATTACKED F-14'S OVER MEDITERRANE.*Availableon 5 15, 2013 available at The New York Times: http://www.nytimes.com/1981/08/20/world/us-reports-shooting-down-2-libya-jets-that-attacked-f-14-s-over-mediterrane.html

[113] *EXECUTIVE ORDER FOR SANCTIONS AGAINST LIBYA.* (1986, 1 8).Available on 5 15, 2013 availableat The New York Times: http://www.nytimes.com/1986/01/08/world/executive-order-for-sanctions-against-libya.html

[114] Pear, R. (1989, 1 5). *U.S. DOWNS 2 LIBYAN FIGHTERS, CITING THEIR 'HOSTILE INTENT'; CHEMICAL PLANT LINK DENIED.*Availableon 5 15, 2013 available at The New York Times :

After the cold war, world politics and pressure of the hegemonic forces changed their ways to operate. Collapse of Soviet Union and clash of the Berlin Wall brought up a new monopolarworld which is ready to exploited by US. US started to play more explicitly especially with the countries which still did not emerged into the global money flow entirely. US started to train troops or agents to cause conflicts, design military coups, make so-called revolutions or overthrow the governments (leaders) who does not suit with US interests[115]. Another important element for being a hegemonic power is to legitimizing its actions through international bodies just like Gramsci mentioned in his work[116]. In the absence of Soviet Union, it was easier for US to use those bodies not only for legitimizing its action but also US can find support and apply more pressure on the countries like Libya[117].

Issue of Libya cannot only be understood by a realist power struggle theory or it cannot be explained by rich underground resources of Libya. There are other states exist which have rich underground resources too(for instance Saudi Arabia) and all the states are

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http://www.nytimes.com/1989/01/05/world/us-downs-2-libyan-fighters-citing-their-hostile-intent-chemical-plant-link.html

[115]Lewis, N. A. (1991, 5 17). *350 Libyans Trained to Oust Qaddafi Are to Come to U.S.*Availableon 5 15, 2013available at The New York Times: http://www.nytimes.com/1991/05/17/world/350-libyans-trained-to-oust-qaddafi-are-to-come-to-us.html?scp=5&sq=qaddafi&st=ny

[116]Theodore H. Cohn, Global Political Economy: Theory and Practice, Pearson: 2005, pg. 131.

[117]Lewis, P. (1992, 4 1). *Security Council Votes to Prohibit Arms Exports and Flights to Libya.*Availableon 5 15, 2013 available at The New York Times: http://www.nytimes.com/1992/04/01/world/security-council-votes-to-prohibit-arms-exports-and-flights-to-libya.html?scp=16&sq=libya+lockerbie+sanctions&st=nyt

included in the power struggle but the main point is submission to the US dominance over the world. If a state accepts this dominance and tries to be part of this system even if it would be exploited, that state will not suffer from global oppression. If a state tries to strengthen and protect its economic and political independence in some respects then it will face with wild side of global capitalism.

4.3.3 TOWARDS THE ARAB SPRING

Capitalism needs free market economy (global economy) to reach more people to exploit. In 21st century, capitalism does not need huge armies or weapons to do this. Main arguments are based on democracy, human rights and liberation which seems as so modern and humanistic values. It is easy to go inside the peoples' minds through global media with the help of high technology communication tools. While pumping these ideas to the people, this so called humanity does not show other issues coming with this humanity package. People does know few about how would they get imprisoned into the third world with this shiny, western ideas.

The protests which started in Tunisia and spread through the region own the same spirit: people were protesting against dictatorship or absolute monarchy, human rights violations, government corruption (demonstrated by Wikileaks diplomatic cables), economic decline, unemployment, extreme poverty, and a number of demographic

structural factors, such as a large percentage of educated but dissatisfied youth within the population[118].

All these reasons which led people to protest against their governments were not constructed by their governments. Developed, industrialized western world first colonized the region (MENA) after the First World War and exploited both labor and natural resources. People of the region left undeveloped[119]. Exploitation continued after the colonization too, it only changed its way of exploiting. Nations of the region started to follow the developed world from a primitive position. It cannot be expected that those nations can reach the European standards of civilization because they were left poor and uneducated. When they start to learn about this civilization, they did not understand the core of or in other words the culture of this civilization. Media was on duty as the fourth power and made these "third world nations" to believe in change. During the conflict between Gaddafi forces and protestors, western world showed its intention by directly intervening the conflict on the side of the opposition forces under the name of NATO intervention. Intervention was not only necessary for helping the opposition to win the battle but also it was for controlling the new era which was about to begin in Libya. Another important question is: so why do hegemonic forces waited for such a long time to intervene and directly (or indirectly) colonize these countries?

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[118]Korotayev A, Zinkina J (2011). "Egyptian Revolution: A Demographic Structural Analysis". *Entelequia. Revista Interdisciplinar***13**: 139–165. Available at http://cliodynamics.ru/index.php?option=com_content&task=view&id=276&Itemid=70.

[119]McNeill, William H. Dünya Tarihi, "Endüstrileşme ve Demokrasi Akımlarına Asya'nın 1850-1945 Yılları Arasında Gösterdiği Tepkiler. 2008, pg. 615-646

Libya is a poor country on water resources. The last step of a brilliant irrigation project was just finished (The Great Man-Made River) in 2007[120] which is expected to pump freshwater to the thirsty lands of Libya. Just before the Arab Spring, Libya and Egypt were planning to build nuclear reactors to solve their energy and water problems. If they could be succeeded they would gain more independence for their economies and their economic growth would be increased. Arab Spring's affect was so harsh on these two countries in the region. They both suffered from revolt, they had civil war and their governments were overthrown. There would be no inconvenience to say that those incidents are the results of efforts for strengthening their independence.

4.3.4 BEHIND THE SCENES

Libya had efforts to produce nuclear energy since 1970s but because of the economic problems, stability issues in the region and US pressure on the countries which were expected to cooperate with Libya for building the nuclear reactors prevented Libya government to finish the infrastructure of nuclear reactor. Libya was in a desire to have nuclear energy to purify water and produce electricity. These two issues are matters of survival in the region which Libya exists in. Egypt is also in the same situation. They need water and energy to keep up developing the industry.

Libya has continued to take steps toward establishing a nuclear power infrastructure. Libya has also completed nuclear cooperation agreements with Argentina, Ukraine, and

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[120] *Libya's "Water Wars" and Gaddafi`s Great Man-Made River Project*. (2013, 5 13). available on 6 18, 2013 available at Global Research: http://www.globalresearch.ca/libyas-water-wars-and-gaddafis-great-man-made-river-project/5334868

Russia, and concluded a memorandum of understanding with Canada[121]. These agreements vary in the amount and type of cooperation offered. The Russian agreement is the most comprehensive, including offers to design and construct a power reactor, supply reactor fuel, and provide technology related to medical isotopes and nuclear waste disposal[122]. The United States continues to review whether it will be willing to cooperate with Libya on the peaceful uses of nuclear energy[123]. As of February 2011, it is unclear whether or how ongoing political turmoil in Libya will affect the state's plans to pursue nuclear energy. Libya was so close to begin producing nuclear energy. The last important meeting was on 20 March 2010: "Libya and Russia discuss possibilities for cooperation on issues such as education, investment, and energy. Representatives from Libya's nuclear energy agency talk about energy cooperation prospects with their Russian counterparts."[124] This meeting was held just eight months before the Arab Spring begin. Some may not find a relation between Arab Spring and nuclear energy production but similarity of Egypt case would be explanatory.

4.3.5 EGYPT

Developments since 2006 had suggested that the Egyptian government, after decades of indifference, was once again strongly interested in investing in a nuclear power program. Early indications of official interest included Gamal Mubarak's call for Egypt to pursue nuclear energy during a September 2006 National Democratic Party

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[121]"Libya moving forward with nuclear power plans," *World Nuclear News*, 8 January 2010, www.world-nuclear-news.org.

[122]"Russia, Libya sign civil nuclear deal as Kadhafi visits," *Agence France-Presse*, 1 November 2008.

[123]Mark Hibbs, "U.S. to review nuclear ties to Libya, but cooperation pact faces hurdles," *Nucleonics Week*, 7 May 2009.

[124]"Libya, Russia discuss boosting of cooperation in energy, economy sectors - agency," BBC Monitoring Middle East, 21 March 2010.

conference, soon followed by similar statements by President Mubarak, his father[125]. In March 2007, Energy and Electricity Minister Hassan Younis announced plans to construct "10 nuclear-powered electricity-generating stations across the country."[126] In 2010, Cairo also formally requested nuclear energy training assistance from South Korea's Korea International Cooperation Agency (KOICA)[127]. Despite significant controversy over the site selection, President Mubarak also announced that El-Dabaa would definitively be the site of the first nuclear power plant[128]. Mubarak made this announcement at August 2010,Five months before Mubarak was swept from power in February 2011. Both Libya and Egypt followed the similar ways to advance nuclear energy in the same timeline. After the revolts and civil wars in those countries, their visions about nuclear energy are uncertain.

These two countries will not meet with nuclear energy to purify their water or proceed heavy industry. The fast spread and mass effect of Arab Spring is not about people who are so eager to live in democracy or freedom unfortunately. At any progressive step, hegemonic forces will stop their colonies with the so called legitimate methods of that time era.

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[125]"Mubarak's Son Proposes Developing Nuclear Energy," Associated Press, 19 September 2006.

[126]James M. Acton and Wyn Q. Bowen, "Atoms for Peace in the Middle East: The Technical and Regulatory Requirements," NPEC Working Paper Series, 2008, p. 12.

[127]"South Korea to train Egyptian nuclear engineers," *World Nuclear News*,available on 21 January 2010,available at www.world-nuclear-news.org.

[128]"Egypt: 1st Nuclear Plant Site Announced," Associated Press,available on 25 August 2010,available at www.jpost.com.

4.4 Far East

The Oil Crisis of the 1970s was what propelled the need to build nuclear power plants in Europe and in North America. However, with the Chernobyl accident in 1986 a retreat was observed due to safety concerns. There has been a revival of the nuclear option since the 1990s, particularly with the rise of Asian nations. The West's immediate concern might be the Middle East, yet Asia is no short of generating a major stir up in the coming years.

Conventional US allies, South Koreaand Japan have already explored the option of nuclear energy. BRIC nations (Brazil, Russia, India and China) are to be the new economic superpowers of 2050 with nuclear capacity. Among these India and China with an annual growth rate of 8 to 10 percent are the declared nuclear powers that will compete for Asian leadership. With populations over a billion, these two growing economies are in grave need of energy to be able to sustain development and to maintain the well-being of the people. Currently India has 19 reactor units in operation (4.2 GWe), 4 under construction, 20 planned, 24 proposed, and 5 research reactors while China has11 reactor units in operation (8.6 GWe), 22 under construction (24.6 GWe), 35 planned, 120 proposed, and 13 research reactors[129]. Likewiseenergy hungry ASEAN countries such as Singapore, Malaysia, Indonesia and Thailand are all planning on developing atomic energy, and in the case of the Philippines re-opening the Bataan

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[129] "Asia's Nuclear Energy Growth" World Nuclear Association. Apr. 2010. available on 17 Aug. 2010available at <http://www.world-nuclear.org/info/inf47.html>

Nuclear Power Plant is in the agenda, to cope with increasing energy and food costs as well as greenhouse gas emissions. "Through 2010 projected new generating capacity in this region involved the addition of some 38 GWe per year, and from 2010 to 2020 it is 56 GWe/yr, up to one third of this replacing retired plant. This is about 36% of the world's new capacity. (Current world capacity is about 3700 GWe, of which 370 GWe is nuclear.) Much of this growth will be in China, Japan, India and Korea. The nuclear share of this to 2020 is expected to be considerable, especially if environmental constraints limit fossil fuel expansion."[130] The projections of well spread nuclear energy in Asia does not necessarily threaten the idea of peaceful coexistence, but nuclear energy's susceptibility into becoming a lethal power and the object of war is a matter of concern in the region. Asia's inclination towards the nuclear is nothing new, as Asia harbors the three non-signatory countries of Non-Proliferation Treaty (NPT) which is the 1970 treaty on the reduction of nuclear arms, and the signatory China.

The most prominent of all the non-signatories is the Democratic People's Republic of Korea. Under the peculiar leadership of Kim Jung-Il, North Korea's withdrawal from theNPT in 2003, and affirmation of nuclear program has become the primary security matter for US allies South Korea and Japan. The Six Party Talks which consist of both Korea's, US, China, Japan and Russia have not revealed any viable outcome for the reversal of the nuclear program, nor has South Korea's Sunshine Policy which favored closer economic and political ties with the North has led to the betterment of the not so friendly relations since the Korean War.

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[130] "Asia's Nuclear Energy Growth" World Nuclear Association. Apr. 2010.available on 17 Aug. 2010available at<http://www.world-nuclear.org/info/inf47.html>

It seems very unlikely for Kim to give up his ultimate nuclear deterrent that enables North Korea to acquire political concessions, overcome economic stagnation, and endow the perseverance of the Kim dynasty. Hopes that a rapprochement between the two Korea's was further hampered as themulti-national forensic investigation team found that a powerful ``external explosion" either directly in contact with or close to the right side the ship, possibly a torpedo sank the South Korean 1,200-ton corvette Cheonan, killing 46 sailors on March 26, 2010. While South Korea tried not to point any fingers at the North till the investigation was over,North Korea denied any involvement in what it considered a "regretful accident." The South Korean President Lee Myung- bak, is determined to put an end to Kim's omnibalancing politics with an all or nothing approach, demanding total denuclearization, an official apology and unification on the long term[131]. They have already taken the case to the UNSC with the support of 58 other nations. The outcome, however, is likely to follow the typical ups and downs of their relationship whereby each side ends up taking a step back , this time around the South is insistent that it is Kim's turn.

Another potential nuclear concern is the historical Indo-Pakistani dispute on territories regarding Jammu, Kashmir and the lack of agreement on the border lines, the cause of two, out of the three major clashes between them. Rivalry between the countries is apparent in the nuclear arms race, which began when India conducted its first nuclear test in 1974. Pakistan announced that she would not fall short, and by the late 1980s they had the means to build weapons. In 1998 both countries bluntly tested nuclear

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[131] "South Korea: North must change, embrace reunification" The Mainichi Daily News: International News ,16 Aug 2010.Available on 19 Aug.2010 available at http://mdn.mainichi.jp/mdnnews/international/news/20100816p2g00m0in003000c.html

weapons, and refused to sign the NPT against all international pressure. By 2005 as Indo-American interests in region coincided, concerns regarding China, Pakistan, Afghanistan and the spread of terror created an opportunity to further improve relations . With the rise of China coming right at them, the Bush administration felt the need to balance China through India[132]. Initially the NPT does not allow a non-signatory to trade nuclear technology and material. Yet, India was off the hook with the 123 Agreement signed in 2007[133]. Under the IAEA (International Atomic Energy Agency) surveillance, India has been allowed to engage in nuclear commerce devoid of NPT responsibility.

Meanwhile, China has been busy with Pakistan, currently has 2 reactors in operation, assisting them in developing civilian nuclear energy. In April, China publicized the sale of two nuclear reactors to Pakistan under an agreement on the advancement of the reactor Chasma first signed in 1991 before China joined Nuclear Suppliers Group which is organized in order to watch over who does what with their nucs without much binding power. "Chinese officials said last month[March 2010] that export of the reactors to Pakistan would be justified in consideration of political developments in South Asia, including the entry into force of the U.S.–India deal and the NSG exemption for India."[134] Counterbalancing India and the US in the region, and the

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[132]Emmot, Bill. "Rivals: How The Power Struggle Between China, India and Japan Will Shape Our Next Decade" Allen Lane:Penguin, April 2008

[133]"India and US Confirm Nuclear Pact" .BBC News Online:South Asia .27 July 2007. Available on 15 Aug.2010 available at<http://news.bbc.co.uk/2/hi/south_asia/6919552.stm>

[134]Hibbs, Mark."Pakistan Deal Signals China's Growing Nuclear Assertiveness" 27 Apr. 2010.Available on 19 Aug. 2010 available at <http://carnegieeurope.eu/publications/?fa=40685>

continuation of China's peaceful rise is closely linked to establishing a stable environment, allowing her to import and export energy to further enable its economic growth, and reinforce Chinese sphere of influence, once known as the Middle Kingdom. China's nuclear capacity not only enhances China's deterrence as a major power, but also is creating a new market in the face of global warming and lack of fuel based resources. China intends to become a major supplier of nuclear energy in the coming years.

Asian nations, and the rest of the world are very well aware of the possible unintended consequences. There may be tense relations, but the escalation of disputes into an all out war between North and South Koreas possibly induced by North Korea as well as an Indian-Pakistani or a Sino-Indian war are not feasible scenarios for the near future. ASEAN's transformation akin to the EU as a socio-economic organization is indeed an indication of a prospering region with little chances of war.In this context, the common focus of the matter will be on Asia's growing demand of energy and finding alternative sources such as nuclear energy, and a turn towards Asia in terms of politics, economics and new power struggles that will come afore should these nations continue to grow.

5. POLITICS OF NUCLEAR ENERGY IN GLOBAL DIMENSION

Being submitted by the USA, Atoms for Peace project was accepted at the (UN) United Nations General Assembly in November 1954. For the global control of atomic power, which is to be used for peace purposes, International Atomic Energy Agency-IAEA was established under the UN, in 1957.[135]

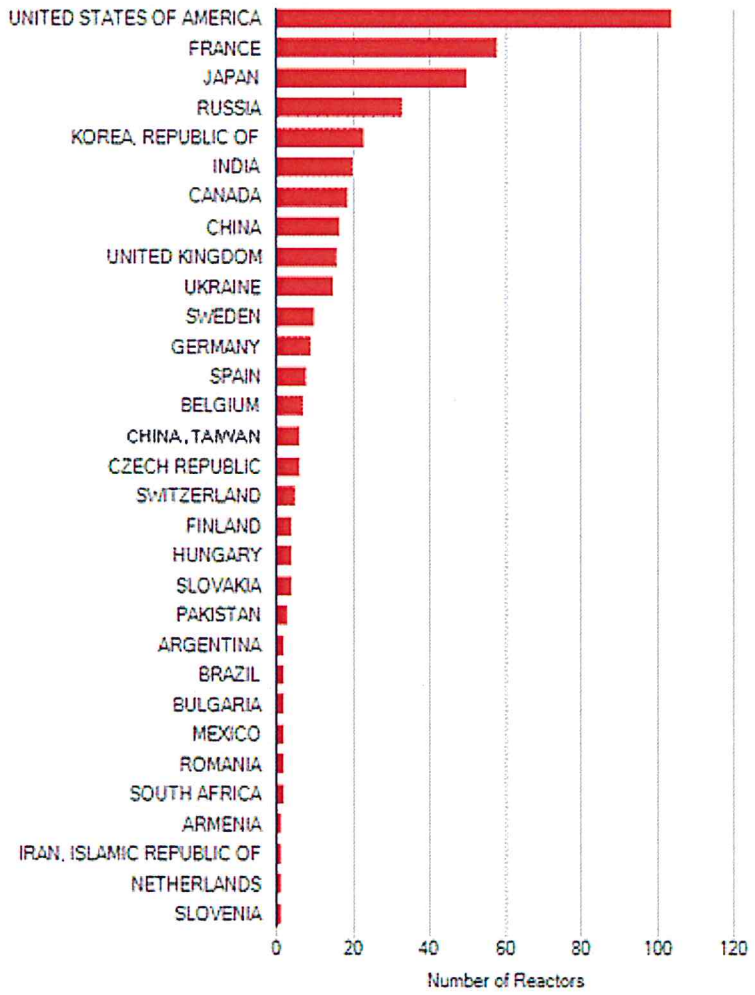

Table-2: Number of reactors in operation, worldwide, 2013-01-18 (IAEA 2013, modified)[136]

[135]Leonard Weiss, "Atoms for Peace," *Bulletin of the Atomic Scientists* 59, no. 6 (November-December 2003), pp. 41-42.

[136]*Nuclear Power Plants Worldwide.* (2013, 1 18). Available on 11 10, 2013 available at European Nuclear Society: http://www.euronuclear.org/1-information/map-worldwide.htm

In 1958, in a report (Director of Central Intelligence, NILE 100-2-58 1, July 1958), prepared by the Office of United States Director of Central Intelligence, it was predetermined that unless necessary international measures were taken, at least 16 countries running civil nuclear plantss were also to produce and try nuclear weapons. According to this report, in 1961, the US President John Fitzgerald Kennedy, by setting up a commission named 'Arms Control and Disarmament Agency',started and international dialogue for both Non-Proliferation Treaty–NPT and Comprehensive Nuclear Test Ban Treaty–CTBT to enter into force.[137]

Kennedy's short life lasted long enough just to sign the CTBT with the Soviet Union in 1963.[138] As of April 2006, 132 countries have signed off the CTBT. However, no 'Nuclear Club' member, notably the USA, has legally carried this agreement into effect. The US President, following Kennedy's demise, Lyndon B. Johnson signed NPT with 164 countries on July 1, 1968. In 1970, Richard Nixon, who was then the US President, ratified the NPT after the approval of the Congress and the Senate.[139]

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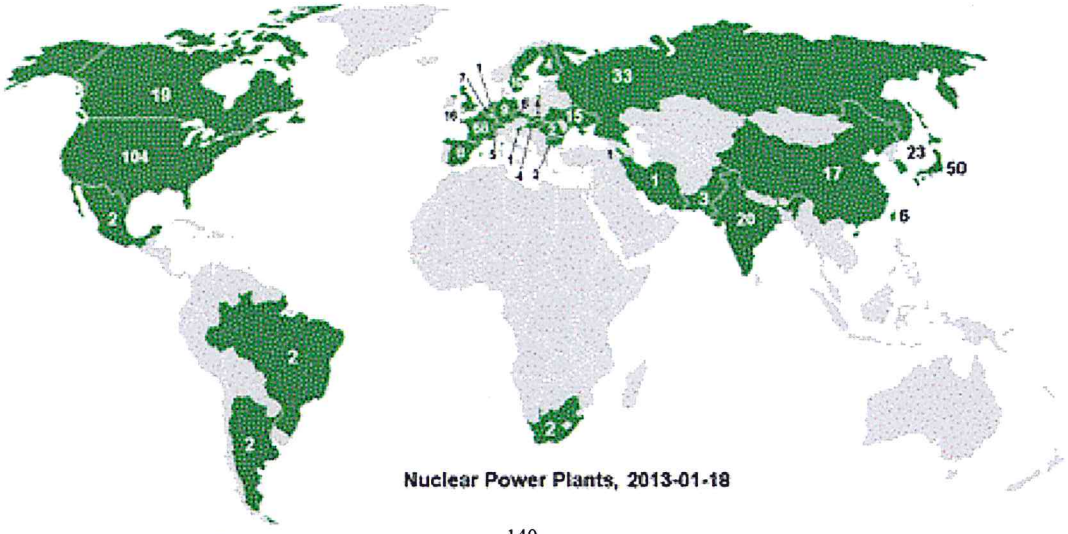
[137]See, e.g., U.S. Director of Central Intelligence, Annex to National Intelligence Estimate No. 100-2-58: Development of Nuclear Capabilitiesby Fourth Countries: Likelihood and Consequences, declassified U.S. National Intelligence Estimate, NIE 100-2-58 (July 1, 1958), at p.4,paragraphs 18-19; U.S. Director of Central Intelligence, Likelihood and Consequences of the Development of Nuclear Capabilities byAdditional Countries, declassified U.S. National Intelligence Estimate, NIE 100-4-60 (September 20, 1960), at p. 2, paragraph 4, & p.8,paragraphs 27-29

[138]BUREAU OF ARMS CONTROL, V. A. (1963, 8 5). *Treaty Banning Nuclear Weapon Tests in the Atmosphere, in Outer Space and Under Water.* Available on 10 22, 2012 available at U.S. Department of State: http://www.state.gov/t/isn/4797.htm

[139]*"ABM treaty reduces US and USSR to one ABM site each" (http://www.fas.org/nuke/control/abmt/). . Retrieved 27 May 2011*

Within the decade following this, the USA, the Soviet Union, England, France and China, which were the first five countries capable of producing and testing nuclear weapons, became the authority in research and development of nuclear weapons by forming a union called 'Nuclear Club'. The Nuclear Club members, who basically meant to preserve their status by means of this union, as we will see in further chapters, violated the agreement and failed to prevent many new countries from producing and testing nuclear weapons.

The basic reason or target of the agreement was to limit the proliferating nuclear weapons, to put an end to weapon testing, to stop the armament race (vertical proliferation– number of nuclear weapons) and other countries' membership to the Nuclear Club (nuclear weapon owner countries-horizontal proliferation); and above all, to demand a complete global disarmament as stated in the 6th Article of the agreement. However, it was also stated that 183 countries (Non-Nuclear Weapon States-NNWS), which are not the members of the Nuclear Club but signed the NPT and do not have the right to nuclear weapons, would be given all opportunities to use the nuclear power for peaceful purposes.



Map -1: World Map of Nuclear Power Plants[140]

In April 1995, 178 countries assembled in New York and discussed the future of the agreement. NWS was hoping to persuade those who are party to NPT to protract the agreement unconditionally and indefinitely. However, many countries and observers asserted that the 4th article of NPT,[141] which introduced the obligation for the NWS to impose disarmament at a large extent, is not executed. Following the negotiations which started in 1995 and continued until 2000, NPT was indefinitely protracted on the approval of 189 countries as an international disarmament agreement with the maximum number of participants ever. India, Israel and Pakistan have not signed this agreement so far. Besides, North Korea, which had already signed the agreement, has

[140] *Nuclear Power Plants Worldwide.* (2013, 1 18). available on 11 10, 2013 available at European Nuclear Society: http://www.euronuclear.org/1-information/map-worldwide.htm

[141] *United Nations Treaty Collection (2009). " Comprehensive Nuclear-Test-Ban Treaty (http://treaties.un.org/Pages/ViewDetails.aspx?src=TREATY&id=488&chapter=26&lang=en)". Accessed 23 August 2009.*

been the first country to declare its unilateral withdrawal from the NPT on January 10, 2003.[142]

Until the early 1980s, nuclear armament doctrines centered upon the East-West hostility. While western countries increased their nuclear power to dissuade USSR from belligerence, the Soviet Union diverted its nuclear weapons towards the western countries. There was also some information that India, Iraq, Israel, North Korea, Pakistan, South Africa and other countries pursued producing nuclear weapons or already achieved that. Again in 1998,[143] Pakistan also declared that it has conducted six trials. In addition, even though it is known for a fact that Israel, who signed the NPT, has been conducting nuclear tests with South Africa[144]they have not declared themselves as NWS up to today. North Korea, on the other hand, declared to the world that it conducted a nuclear test in September of they year 2006. However, these countries were not a part of the "nuclear deterrence strategy" of the Cold War until the early 1990s. Following the disintegration of the Warsaw Pact and the Soviet Union, the worldwide proliferation of weapons of mass destruction (nuclear, chemical and biological) became the first item on the international security agenda. The NWS initiated the re-planning and expansion of its own nuclear deterrence strategies against regional expansionists which the NWS suspected. Even though strategies against

[142]*Nuclear Age Peace Foundation (wagingpeace.org), 10 April 2003,* available*on North Koreas Withdrawal from Nonproliferation Treaty Official (http:// www.wagingpeace.org/articles/2003/04/10_chaffee_korea-npt.htm*

[143]Prime Minister Mohammad Nawaz Sharif, 28 May 1998, available on http://nuclearweaponarchive.org/Pakistan/PakTests.html

[144]Weiss, Leonard. The Vela Event of 1979 (or the Israeli Nuclear Test of 1979) Center for International Security and Cooperation, Presentation, 10.12.2012.

nuclear proliferation are efforts which do not involve nuclear weapon as a basis, new roles were casted to these weapons in order to deter the regional expansionists or to wage war with them.

IAEA ignored the fact that Pakistan initiated military nuclear programme in the 1970s with the support of Western countries, even though it knew. When the US government and the CIA informed the IAEA about the nuclear fuel programme secretly ran by South Korea in the 1980s, the said organisation once again continued its double standard implementations in terms of the interests of "nuclear cartel" and "Nuclear Club".

After the 1990s, uranium enrichment or nuclear weapon raw material production programmes developed in countries such as South Africa, Iraq, Libya, South Korea, Iran and Pakistan set forth how IAEA was governed by the "nuclear cartel". On the other hand, the most developed plutonium programme still ran by Japan is worldwide known. As it can also be seen in the Iraw, Iran and North Korea scandals witnessed in the recent years proved that how the IAEA discriminated governments while watching their nuclear activities according to their political and economic positions.

The IAEA, with the purpose to see the said secret nuclear fuel programmes which began to spread rapidly in the 1990s closer, put an "Additional Protocol" into practice which is a new monitoring system in 1999 as a result of the pressures coming from the "Nuclear Club". With this protocol, suspicious research and development laboratories in countries who are a party to the NPT bears a more effective inspection and monitoring

purpose on the part of IAEA. However, the said has not been effective yet due to the deficiency in finance and technical human resourses.

On the contrary, the Bush government, which won the election in 2001, pursued an international policy which would endanger the progress made regarding nuclear disarmament activities which have been maintained throughout the world with great efforts. This policy of the United State's to be the single superpower, provokes a new armament race which has been also seen in the Iran and North Korea example. As a result of the aforesaid, the conversion of the 1995 dated "Conference on Disarmament (CD)" which is expected to monitor the NPT process and has 65 members, into an international treaty which aims to prohibit the production of fissile (develops as a result of fission) material for weaponary purposes in the world has been interrupted.[145]

According to the observations that the NWS has been conducting nuclear weapon testing data and simulation technologies within its structure. For example, it is known that the USA has provided England and France with the opportunity to access these types of information. France proposed financial support, amount of which has not been expressed, to the proposed USA National Ignition Facility in order to use it for simulation trials.

The transfer of nuclear technology which is the key element of nuclear weapons to Russia, back in the days of the Soviet Union, India, China and North Korea contributed greatly for the establishment of reactors and training of the required technical personnel. It is known by the whole world that Russia still transfers the technology of the nuclear

[145] Final Document of the 1995 Review and Extension Conference of the Parties to the Treaty on the NonProliferation of Nuclear Weapons, document NPT/CONF.1995/32 (Part I), annex, decision 2, para. 8.

reactor, construction of which still continues in Iran and nuclear weapon manufacturing technology which is suspected to be hidden within this programme against for a great expense. Russia was also negotiating with Egypt and Libya just before the Arab Spring to build nuclear power plants in those countries. Russia is still on a pursuit for nuclear power plant cooperation with Egypt. On 11th of July 2013, "These are not projects of cooperation with any specific government. Rather these projects are aimed at promoting cooperation between our countries, and their implementation will benefit both the countries and their people. That is why our position is that the core national interest will serve to determine the policies of the new Egyptian authorities."

Lavrov said at a press conference after talks with Malaysian Foreign Minister Anifah Aman.[146] At the same time the USA sent nine super computers with a capacity to carry out launching, transfer, explosion and design simulations of nuclear weapons in Israeli universities. Another concerning cooperation within NWS is regarded to be the England-France Nuclear Commission, established in 1994 for the coordination of nuclear topics and Russia joining their missile defense programmes. "Global Positioning System (GPS)" is used as beacon in these programmes.[147]

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[146]Interfax. (2013, 7 11). *Lavrov hopes national interests will determine new Egypt authorities' approach to contacts with Russia.* available on 10 25, 2013available at http://rbth.co.uk/: http://rbth.co.uk/news/2013/07/11/lavrov_hopes_national_interests_will_determine_new_egypt_authorities_app_27988.html

[147]"The Russian Federation's support for the Comprehensive Nuclear-Test-Ban Treaty". *CTBTO Preparatory Commission.* 2008. Retrieved 4 December 2011

Within the framework of the nuclear cooperation agreement with France in 1980, Iraq was in the state to have developed highly enrinched uranium, nuclear technology and materials which enable Iraq to potentially achieve plutonium. France, together with providing support for the education and training to nuclear scientists in the Tuwaitha Nuclear Plant, provided highly enrinched uranium and construced two reactors. Italian nuclear laboratories transferred fuel production technology to Iraq and enriched uranium from Germany.

After the Korean War, leader of North Korean Kim Il Sung initiated its country's nuclear weapon programme in the 1960s by establishing a "pilot reprocessing facility" named "radiochemistry laboratory" provided from the former Soviet Union.[148] North Korea, with the economic and technological support provided from the People's Republic of China, initiated to operate the first reactor in 1986 with a 5 megawatt installed power in the facility called "Yongbang". In addition, reprocessing and uranium enrichment facilities which decompose plutonium-239 with used nuclear fuel rod, were established in this facility.

Countries which are developed in terms of nuclear technology, are at the top of the list for providing nuclear weapon and materials to NNWS. For example, Germany and Canada provided weapon and material to South Africa.[149] Argentina who are a party of

[148]See, e.g., Bunn and Zhang, Decommissioning North Korea's Nuclear Facilities: Issues, Options, and Costs.

[149]Evseev, Vladimir V. The Influence of the International Trade of Nuclear Materials and Technologies on the Nuclear Non-proliferation Regime, available at http://www.un.org/disarmament/education/wmdcommission/files/no39.pdf

the NPT alongside with Brazil and Israel who is not a party of the NPT. Sweden transferred enrinched uranium and tritium to South Africa, heavy water and enrichment technologies to Argentina and centrifuge technology to India.[150]China, on the other hand, lended assistance to Argentian, Pakistan and South Africa regarding enriched uranium.[151] Parties of the NPT, in the same time, monitor countries who are not parties of the NPT such as Pakistan, Israel and India with deep concern.

Sweden ran a secret nuclear weapon development programme which aimed to produce 10 nuclear warheads between the years 1945-1972.[152] According to the reports published in the Washington Post the programme was ended in the years 1971-1972 with 10 underground tests by using plutonium fit for weapon production in small amounts. Contrary to the explicit law enforced by the Swedish Parliament, this programme was kept hidden from the world and Swedish population.[153] In December of 1994, on the other hand, it came into the open that Sweden was holding the Agesta reactor in the underground and a team of nuclear scientists at disposal as a part of the

[150]Evseev, Vladimir V. The Influence of the International Trade of Nuclear Materials and Technologies on the Nuclear Non-proliferation Regime, available at http://www.un.org/disarmament/education/wmdcommission/files/no39.pdf

[151]Evseev, Vladimir V. The Influence of the International Trade of Nuclear Materials and Technologies on the Nuclear Non-proliferation Regime, available at http://www.un.org/disarmament/education/wmdcommission/files/no39.pdf

[152]Elam,Mark, Sundqvist, Göran. Carl Country Report Sweden, Section for Science and Technology Studies Göteborg University, Sweden, February 2006. available at http://webhost.ua.ac.be/carlresearch/docs/20060313113811PDAD.pdf

[153]Elam,Mark, Sundqvist, Göran. Carl Country Report Sweden, Section for Science and Technology Studies Göteborg University, Sweden, February 2006. available at http://webhost.ua.ac.be/carlresearch/docs/20060313113811PDAD.pdf

paused nuclear weapon programme which was most likely to be reinitialised within a month.[154]

It is believed that Israel possess more than 200 nuclear weapon warheads and 0.33 tonnes of plutonium for nuclear weapon purposes.[155] These numbers were revealed when the nuclear programme of Israel was declared to the public by a nuclear expert named MordehayVanunu. In 1999, according to the projections of the USA Defence Intelligence Agency (DIA) Israel possessed 60-70 nuclear warheads and enough amount of enriched uranium and plutonium which could immediately be used to produce 115-190 more nuclear warheads.[156]

Up until today, Pakistan who signed the NPT and CTBT Treaties developed its nuclear weapon programme with the support of a wide range of nuclear suppliers which include Canada, Germany, England, Soviet Union, France, Belgium, Netherlands and Switzerland.[157] In addition, necessary technological information were stolen and transmitted to Pakistan through scientists who work in European countries like Dr.

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[154]Elam,Mark, Sundqvist, Göran. Carl Country Report Sweden, Section for Science and Technology Studies Göteborg University, Sweden, February 2006. available at http://webhost.ua.ac.be/carlresearch/docs/20060313113811PDAD.pdf

[155]Nuclear Weapons: A Comprehensive Study, Department for Disarmament Affairs Report of the Secretary-General, United Nations Publication, 1991. available at http://www.un.org/disarmament/HomePage/ODAPublications/DisarmamentStudySeries/PDF/SS-21.pdf

[156]Nuclear Weapons: A Comprehensive Study, Department for Disarmament Affairs Report of the Secretary-General, United Nations Publication, 1991. available at http://www.un.org/disarmament/HomePage/ODAPublications/DisarmamentStudySeries/PDF/SS-21.pdf

[157]Evseev, Vladimir V. The Influence of the International Trade of Nuclear Materials and Technologies on the Nuclear Non-proliferation Regime, available at http://www.un.org/disarmament/education/wmdcommission/files/no39.pdf

Abdul Qaader Han.[158]Morever, centrifuge design and technologicall information were sold to countries such as North Korea, Iraq, Libya and Iran at black market prices by means of the international network established by Dr. Han.[159] As a result of the reactions displayed at an international level, the President of Pakistan General Pervez Müşerref had to arrest Dr. Han at his house. However, the Pakistani government has not allowed any international organisation such as IAEA to investigate Dr. Han.[160]

It was declared that two bomb tests of Pakistan which were conducted in 1998 with the enriched uranium produced to be convenient for weapon production at Kahuta Enrichment Facility as of since 1986 were successfully carried out underground. It is calculated that approximately 130-220 kilogram highly enriched uranium (HEU) fit for weapon production was produced at this facility until the end of 1991.[161] As India refuses IAEA inspection, Pakistan is also denying the inspections. Once again according to the estimation of DIA, there are around 40-50 nuclear warheads ready for use and enought amount of Pu-239 and U-235 to build 55-90 more nuclear warheads in Pakistan.[162]

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[158]Evseev, Vladimir V. The Influence of the International Trade of Nuclear Materials and Technologies on the Nuclear Non-proliferation Regime, available at http://www.un.org/disarmament/education/wmdcommission/files/no39.pdf

[159]Evseev, Vladimir V. The Influence of the International Trade of Nuclear Materials and Technologies on the Nuclear Non-proliferation Regime, available at http://www.un.org/disarmament/education/wmdcommission/files/no39.pdf

[160]Ibid

[161]Jeffrey T. Richelson, *Spying on the Bomb* (New York: W.W. Norton & Company, 2007), pp. 330-332.

[162]Bunn, George, The World's Non-Proliferation Regime in Time, IAEA Publications. available at http://www.iaea.org/Publications/Magazines/Bulletin/Bull462/nonproliferation_regime.html

The 12 kilotons of nuclear trial in 1974 proved that India can manufacture nuclear weapons.[163]Discussions towards nuclear weapon development has been becoming widespread since the 1960s, especially after China's first trial in October, 1964. A heavy water cooled reactor (CANDU) which operates with natural uranium of Canadian origin,[164] heavy water and nuclear fuel was sold to India by Canada and the USA.[165] None of the facilities in India are subject to international inspection. France, between the years 1973-1978 provided help for the construction of a huge reprocessing facility, as known as Tarapur Power Plant and provided India with uranium for a period of 10 years from 1983 until 1993. The Former Soviet Union, on the other hand, sold heavy water to the Rajastan reactors of the aforementioned country.[166]

In the same time, India developed a uranium enrichment facility and with the addition of the aforesaid India now has 10 nuclear reactors.[167] Also in 1985 it offered the Dhurva Reactor which produced 2.5 kilograms of plutonium a year. In 1986, the plutonium of Madras Facility, a part of the Prefre Reprocessing Facility that cannot be inspected was

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[163]Evseev, Vladimir V. The Influence of the International Trade of Nuclear Materials and Technologies on the Nuclear Non-proliferation Regime, available at http://www.un.org/disarmament/education/wmdcommission/files/no39.pdf

[164]Evseev, Vladimir V. The Influence of the International Trade of Nuclear Materials and Technologies on the Nuclear Non-proliferation Regime, available at http://www.un.org/disarmament/education/wmdcommission/files/no39.pdf

[165]Ibid

[166]Ibid

[167]*Nuclear Power in India*. (2013, 12). available on 12 1, 2013, available at World Nuclear Association: http://www.world-nuclear.org/info/Country-Profiles/Countries-G-N/India/#.UkoO34Y0wRQ

initiated to be decomposed. It is calculated that India has the capacity to annually produce about 75-200 kilograms of plutonium which 5-10 times higher than its need for nuclear energy and research programme.[168] It is estimated that India has decomposed 290 kilograms of plutonium up until now for nuclear weapon purposes. According to the estimations of DIA in 1999, there are 50-60 nuclear warheads ready for sue and enough amount of Pu-239 and U-235 to produce 60-105 more nuclear warheads in India. The President of the USA, George W. Bush, confirmed to be an associate member of the Indian Nuclear Club by the nuclear cooperation agreement during his visit to India last year.

NPT, was amended in line with the interests of the biggest industrial powers rather than in line with the prevention of the proliferation of nuclear weapons due to political, industrial and economic reasons. In such case, countries which carried out huge military and civilian plutonium programmes like England and France might have used the "so-called" civilian plutoniu produced for Japan in their own nuclear programme.

Moreover, according to the IAEA standards established in 1977, the five NWSs are obliged to determine and report within seven days in case at least 25 kilograms of enriched uranium, 8 kilograms of plutonium which are fit for weapon production are missing from all of the civilian reactors and facility inventories around the world. According to the announcements made by IAEA in 1994, the

[168] *Nuclear Power in India*. (2013, 12). available on 12 1, 2013, available at World Nuclear Association: http://www.world-nuclear.org/info/Country-Profiles/Countries-G-N/India/#.UkoO34Y0wRQ

amount of nuclear materials which must be inspected has increased by 400 per cent since 1981 with the expansion of nuclear industry and proliferation of the said to the Far East and underdeveloped countries and became out of hand as it can be seen from the examples below. According to the examination of the Department of Trade and Industry at the Sellafield Fuel Reprocessing Facility in England, it was found out that at least 104 kilograms of plutonium, in other words enough amount to produce 26 nuclear weapons disappeared.

On the other hand, according to the report entitled "The First 50 Years: United States Plutonium, Production, Acquisition and Utilisation" published in February of 1996 by the USA Department of Energy (DOE), 610 kilograms of plutonium-239 which was produced between the years 1969-1994 and used in weapon production and with which 150 nuclear weapons can be produced has gone missing, with no leads to whereabouts of the material. What happened to the said amount of plutonium is still a mystery. None of the international organisation still do not knows the amount of nuclear materials in nuclear facilities of Russia.For that reason, how much of the processed nuclear fuel in todays Russia and former Soviet Union was stolen at what time and transferred to which governments through which means.

IAEA could not confirm that Iraq explicitly breached NPT rules during the inspection carried out in 1980. Iraq was developing its own nuclear weapon programme with the information, technology and materials coming from the USA, England, France, Switzerland and Germany. In a similar way, it was known that the USA was

transferring susceptible nuclear technology, design and computer technologies to Japan between the years 1987-1994.[169] In the end of the year 2004, it was once again revealed how the uranium enrichment programme, which has been running in South Korea for a period of 20 years was not implementing the NPT rules of IAEA. It was revealed that between the years 1979-1982, South Korea enriched uranium-235 through chemical methods, secretly produced plutonium-239 even though for a "small amount", developed chemical-laser dissociation, atomic-vaporisation-laser isotope separation (Atomic Vapor Laser Isotope Separation – AVLIS) programmes which are uranium isotope separation methods as a result of the technological supports received from Russia and the USA under the name "nuclear technology transfer" and how it did not report these activities to IAEA as a party of the NPT.[170]

The nuclear adventure between the IAEA and Iran which turned into a puss-in-the corner and that has occupying the whole world public opinion for the last 10 years once again shows how the IAEA went bankrupt. The Iranian government, with the centrifuge technology it bought from nuclear technologies black market of Dr. Abdul Qaader Han launched its pilot uranium enrichment facility which is comprised of 164 centrifuge in 2003 despite the surveillance of IAEA.[171] Additionally, the Iranian government, once

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[169]Evseev, Vladimir V. The Influence of the International Trade of Nuclear Materials and Technologies on the Nuclear Non-proliferation Regime, available at http://www.un.org/disarmament/education/wmdcommission/files/no39.pdf

[170]Evseev, Vladimir V. The Influence of the International Trade of Nuclear Materials and Technologies on the Nuclear Non-proliferation Regime, available at http://www.un.org/disarmament/education/wmdcommission/files/no39.pdf

[171] "ISIS Analysis of IAEA Iran Safeguards Report:". Institute for Science and International Security. 30 August 2012. Retrieved 2 September 2012

again despite the surveillance of IAEA, informed the agency that it will establish at least 3 thousand centrifuge ready for use by the end of the year 2006 in the facilities established in underground tunnels in this region with a capacity of 50-60 thousand centrifuge.[172]

Moreover, it is known that at least 110 tonnes of uranium-hexaflouride will be produced by the end of the year 2006 at the uraniu conversion facilities in Esfahan. It is calculated that with this amount of uraniumhexaflouride, enough amount of uranium to produce 20 nuclear weapons will be achieved after the enrichment process at centrifuge facilities.[173] According to the estimations made by IAEA, if Iran completes and takes its facility that includes 2-3 thousand centrifuge into operation, it could annually possess 28-30 kilograms of enriched uranium which is used for nuclear weapon production (90 per cent pure U-235). According to this scenario and with regard to the nuclear weapon production design in hand Iran will have produced 10-20 nuclear weapons by the year 2009.[174]

Necessary technology and material to countries which wish to produce nuclear weapons. Due to the "fit for multiple means of use" nature of nuclear technology, fuel and many reactors, Article IV directly weakens the aim of the treaty to prevent the

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[172]"ISIS Analysis of IAEA Iran Safeguards Report:". Institute for Science and International Security. 30 August 2012. Retrieved 2 September 2012

[173]"ISIS Analysis of IAEA Iran Safeguards Report:". Institute for Science and International Security. 30 August 2012. Retrieved 2 September 2012

[174]"ISIS Analysis of IAEA Iran Safeguards Report:". Institute for Science and International Security. 30 August 2012. Retrieved 2 September 2012

proliferation of nuclear weapons. Furthermore, alongside with the risk the nuclear energy creates for the prevention of nuclear proliferation, it was proved to be uneconomic and unsustainable.

The Germany-Brazil treaty signed in 1974 was the nuclear treaty with the widest scope ever.[175] In addition, it is known for a fact how the Dutch and French governments indirectly supported the nuclear weapon programmes developed in Pakistan and that this scandal led to the resignation of the Dutch government in 1979. More than half of the nuclear reactors sold by the USA until the September of 1975 belonged to India, Pakistan and Israel who were not a party of the NPT.

Atomic Energy of Canada (AECL), which is an organisation of the Canadian government spends the 128 million dollar support it receives from the government every year for the introduction, marketing of CANDU type reactors fit for military and civilian use to Third World Countries ever since the 1970s and for the distribution of the said to the politicians of those countries as a bribe. All of the financing for the reactors established up until today in Romania, India, South Korea, Brazil, China and Argentina by the AECL was compensated by the Canadian government. It was revealed as a result of senate investigation (Multinational Monitor, "The Shady Nuclear Trade of Canada" September 1995)that the Canadian government lost 10.5 billion dollars as of 1995 as the credits provided to Argentina and Brazil were not paid back.

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[175]Evseev, Vladimir V. The Influence of the International Trade of Nuclear Materials and Technologies on the Nuclear Non-proliferation Regime, available at http://www.un.org/disarmament/education/wmdcommission/files/no39.pdf

Upon the reveal of the bribes distributed by the AECL to the countries where CANDU reactors were marketed and constructed, many politicians and bureaucrats in many countries ranging from South Korea to China were arrested and imprisoned. It is also known that AECL is pursuing two Akkuyu Nuclear Power Plant Tenders which have not been conducted for various reasons. Rumors that AECL was distributing bribes in Turkey were also revealed but none of the bureaucrats or politicians were arrested for this reason. Moreover, due to the scandals that rose about the Italian company Consaldi which undertook the construction of CANDU reactor in Romania,[176] the former President of Italy BetinoCraxi was arrested and improsined on the grounds that he received 610 thousand dollars bribe from AECL.[177] No sanctions were imposed to the Canadian government and AECL by IAEA and NWS countries despite the aforementioned reasons.[178]

"Peaceful Nuclear Explosions"(PNE) got out of date as a whole. The USA ended the PNE programme in 1977.[179] The former Soviet Union set forth industrial purposes such

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[176]Brooks, Gord L. A Short History of the CANDU Nuclear Power System, Prepared for the Ontario Hydro Demand/Supply Plan Hearing, January 1993 available at https://canteach.candu.org/Content%20Library/19930101.pdf

[177]Forcese, Craig, Multinational Monitor,Vol. 16, No. 9 "The Shady Nuclear Trade of Canada" September 1995 available at http://www.multinationalmonitor.org/hyper/issues/1995/09/mm0995_06.html

[178]Ibid

[179]*Peaceful Nuclear Explosions*. (2012, 1). available on 9 19, 2013 available at CTBTO: http://www.ctbto.org/nuclear-testing/history-of-nuclear-testing/peaceful-nuclear-explosions/

as to build a dam, variate river dam, search natural gas, etc. as a cover sheet for certain nuclear trials, however it also ended these hazardous practices in 1982. It is clear that PNEs cause proliferation risks.

The preservation of this provision of the treat is against the CTBT. Whether nuclear explosions are carried out for military or peace purposes cannot be distinguished and it is impossible to develop nuclear trials solely to be used for peaceful purposes. For example, India claimed its single nuclear trial to be for "peaceful purposes". PNEs are also devastating in terms of environment and cause for the propagation of radioactive substances.

For the NPT to comply with the obligation to abandon nuclear weapons arising from the revision and extension meeting during the months, april-may of 1996 of article VI of the treaty with the USA was vital in terms of NNWSs to accept the unlimited extension of NPT or not. The President of the USA, Bill Clinton, declared that the country will not be producing fissionable materials for nuclear weapons on 27th September, 1993. Clinton asked Russia to follow the same path.

In 2003, within the scope of counter-proliferation of nuclear weapons, it was planned for the USA to possess 4 thousand 450 warheads, 3 thousand 500 of which to be strategic and the remaining 950 to be nonstrategicat its nuclear arsenal. The strategic nuclear power of the USA in 1994 was comprised of 7 thousand 900 warheads and despite this great numbers of warheads, it was lower than the 13 thousand peak back in 1987.

Following the START I and START II treaties signed between the USA and the former Soviet Union regarding the reduction of nuclear warheads, the number of warheads in the USA, which possessed 13 thousand warheads decreased to 7 thousand 900. 3 thousand 400 of that 7 thousand 900 which were ready to be fired at any time were kept in various missiles and submarines which are equipped with intercontinental ballistic missiles. According to the plans newly developed against nuclear weapon proliferation, it was decided for this number to be increased to 4 thousand 550. Even though it is known by Russia that around 2-3 thousand nuclear weapons are annually demounted in the USA, it is believed that new nuclear warheads for the newly established SS-25 ICBMs (Intercontinental Ballistic Missiles) are produced in Russia by its nuclear weapon facilities. In every case, the Russion military nuclear weapon industry continues to be the greatest and most effective industry. The 35 "forbidden cities" of the Ministry of Atomic Energy, Ministry of Defence and State Defence Industry Committee which operate regarding the production, demounting and deployment of nuclear weapons and nuclear weapon systems still remains in Russia. Approximately 2 million people inhabits in these cities.

France has a bad reputation regarding disarmament initiatives. She refused to sign the "Limited Test Ban Treaty" which bans nuclear tests in the atmosphere and underwater. France refuses this treaty as its seabed must be decontaminated from nuclear. France also refused to sign the 1972 convention which bans the "Biological and Toxic Weapons Convention". France protested or avoided to participate in the UN resolutions which summoned countries for nuclear weapon ban. France did not attend to any multilateral meetings regarding the reduction of nuclear weapons.

The French government, since the year 1960, has produced 1110 nuclear warheads in 10 different types with the plutonium-239 it acquired from the so called nuclear power plants which produce electricity. It is estimated that France spent around 22 billion dollars for nuclear power until the end of the last century. In addition France purchased advanced computers from the USA for the simulation of effects of nuclear tests during the first years of 1990s.

For the time being, the USA, France and England have not approved the related protocols of the "South Pacific Nuclear Free Zone Treaty". Similar concerns remain regarding developing and actualising "African Nuclear Weapon Free Zone".

For nuclear weapons to be situated in the Mediterranean, Europe and Asia explicitly prevents these regions to be purified from nuclear and other mass destruction weapons. Nuclear weapons of the USA and England in Germany continues to prevent the further implementation of Article VII in Europe. Even though Nuclear Free Middle East has been put to discussion in UN, no conclusions can be drawn due to the Israeli barrier.

The revision meetings for the NPT which have been carried out every five years are considered to have been successful. Especially for the parties to agree on the unlimited extension of the NPT in 2000 which was proposed in 1995 is regarded to be the most important international step that the treaty has ever taken.

Following the discussions which were initiated once again in 1995 and continued until 2000, the term of NPT which is the only international treaty with the most participants was extended indefinitely with the signature of 189 countries. India, Israel and Pakistan

have not yet signed the aforementioned treaty. In addition, North Korea became the only country which unilaterally withdrew from the NPT on 10th January, 2003.

CONCLUSION

Nuclear energy politics is one of the main issues for international relations and especially for energy politics. Nuclear energy has the capacity for solving energy problems of underdeveloped or so called developing countries because energy which is derived from the fusion of the atoms is the longest lasting and most powerful source among all the energy sources. As SümerŞahin states "World's energy future will be shaped by nuclear energy for certain because density of nuclear energy is significantly higher than any other energy types."[180]having nuclear technology is not only mean to have mass energy production but also nuclear technology is the key for future development of technology.

While developed countries and superpowers of the world are using nuclear energy for their prosperity, states which are planning to produce nuclear energy in their countries becoming the pawns of nuclear energy politics. Countries which both own nuclear technology and strong economy have the chance of using this energy source according to their interests and also according to their peoples' desires. European countries can be claimed as the leading users of nuclear technology when compared to other countries of the world. All regulations and needed controls are on the hands of EURATOM and states are usually independent about the decisions for energy issues. Germany is an important role model for modern nuclear energy decision making. Germany is a country which used to have nuclear energy for almost 50 years. Germany decided to shut down its nuclear power reactors until the year 2022.[181]

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[180]Interview with Sümer Şahin

[181]World Nuclear Association. (2013, 10). *Nuclear Power in Germany*. Available on 10 8, 2013 available at World Nuclear Association : http://www.world-nuclear.org/info/Country-Profiles/Countries-G-N/Germany/#.UkR2joY0wRQ

Former Secretary of State Henry Kissinger, had a theory on 21st century nuclear weapons issue which iscalled as "domino theory".[182] Domino theory originally derived from the spread of communism by the effect of a socialist nation to its neighboring nations.[183] In Kissinger's terms if one state owns nuclear weapons somehow, this state will affect all neighboring states and whole region will start to own nuclear weapons and technology. Kissinger used this framework to define Iran case. It is obvious that this domino effect leads those countries for a nuclear arms and nuclear weapons race. If a country does not own the nuclear technology than it has to become an exploited player in nuclear energy politics.

States are definitely shaped like social classes in a society. Capitalist world system is designed for advantage of the states which are called as superpowers in realist terms. In Marxist terms, those countries and their alliances can be called as hegemonic forces. While the world is in a transformation, capitalism redefines itself and its methods to colonize and exploit. Even the typology to classify the states explains the system. States which are classified as third world countries are having problems like Libya and Egypt, just like the labor class in a society. Nobody can blame the ruling and bourgeois classes for what they are doing because law system is shaped by those classes so international law is also shaped by hegemonic forces of global economy. The Arab Spring is a contemporary example of the 21st century imperialism to understand how it works. Both Husnu Mubarak and Muammer Gaddafi were leading their countries for nearly half a

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[182]Sabrosky, A. N. (2008, 10 22). *An Imperial Recessional: The "Domino Theory" Revisited.* Available on 11 6, 2013 available at First Principles, ISI Web Journal: http://www.firstprinciplesjournal.com/articles.aspx?article=471&theme=home&page=1&loc=b&type=ctf

[183]Domino Theory, Wikipedia, available on 11 6, 2013 available athttp://en.wikipedia.org/wiki/Domino_theory

century and they are overthrown by the hands of their people. In other words, imperial system will be the same but methods of exploitation will be always different according to the circumstances in the world. During the Arab Spring, Middle East faced with other issues too. Stress between Turkey and Israel, Iran's nuclear program and so on. All these issues came forward while EU was in a crisis, Russia was strengthening its hand by its rich underground resources and missile shield project of the US increasing the global temper. All these issues are signals of capitalism to emerge in a new form for ecploiting resources and imperial struggle never changes.

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