

# A review on Iranian nuclear deal

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The wheels of history turns as the world observes a big step taken by the superpowers to maintain peace. Iran puts the superpowers into dilemma of the nuclear power it has. The pact signed between Iran and superpowers is a matter of international security and thus is pivotal.

*Index Terms* – P5+1 nations, JCPOA, Nuclear enrichment, Ballistic missiles, LEU, IRGC

## 1. INTRODUCTION

‘Is nuclear energy a boon or curse?’ has always mumbled the human minds. A reaction which can solve the world energy problems economically, if used for making weapons can turn the earth into dust in no time. The trending talk that has taken the P5+1 super powers to the task is a matter of essential debate as it not only threatens the use of nuclear weapons but also highlights important international economic agenda. P5+1 are the permanent members of UN’s Security Council. P5+1 includes China, France, Russia, United Kingdom and United States plus Germany. The nuclear fission process often produces free neutrons and photons releasing large amount of energy. Nuclear fuels undergo this fission reaction which opens two doors, a reaction with controlled rate widens the scope of energy resources and uncontrolled rate can make a nuclear weapon.

Never ending threat of Iran’s nuclear program seemed to reach a meaningful conclusion but has created great political tension. Sensing the need of restricting Iran for developing powerful nuclear weapons, P5+1 nations introduced JCPOA (Joint Comprehensive Plan of Action), the deal which was agreed between Iran and P5+1 nations.

Finally, after years of strong-weak negotiations on JCPOA (Joint Comprehensive Plan of Action), P5+1 countries and Iran finally arrived at an agreement signed at Vienna on July 14. Iran in past has signed many treaties in context of Biological weapon conventions, but this deal was the most promising of all for both, P5+1 nations and Iran. Nuclear capabilities of Iran are indirectly helping Iran in terms of economic development. Iran is facing sanctions from these super powers in context of terrorism, human right abuses, production of nuclear weapons and many other, hurting Iran deeply. Nations know the capability of Iran to produce enriched uranium. Iran is perhaps capable of destroying any nation with its nuclear strength. JCPOA also restricts Iran to develop ballistic missiles which are powerful enough to travel continent. It does not permit Iran to develop ballistic missiles in any way. Iran possesses several research sites, 3 uranium mines, 3 research reactors, 5 unknown nuclear sites: Arak, Fordo, Isfahan, Natanz and Bushehr.



[Figure 1: Bushehr Nuclear Plant]

## 2. URANIUM, CENTRIFUGES AND BALLISTIC MISSILES:

Nuclear energy by the means of nuclear reaction are used in steam turbines sharing 10.9% in World's electricity generation by fuels. (2012 SURVEY BY IAEA). IAEA-International Atomic Energy Agency. A neutron is absorbed by a uranium-235 nucleus which turns into a uranium-236 which is in highly excited state which is known nuclear fission.

When uranium ore is dug from the ground, uranium oxide is obtained. This oxide contains U-238 and U-235 isotopes. Despite both being radioactive, it is only U-235 which can be split by firing neutrons. The cycle is repeated by the neutrons which are formed by the breaking of the U-235 atom. The biggest challenge lies in availability of U-235 from the oxide which consists more of U-238 and trifle of U-235. Hence, treatment of Uranium for obtaining concentrated U-235 becomes essential. Given the fact, that they are chemically identical, no specific method is available to serve the purpose. However, the mixture is treated with fluorine gas followed by their passage through fine porous material for enrichment.

The gas spins in centrifuges at a great force and lighter U-235 isotopes stay in centre while U-238 isotopes stick to the wall of the centrifuges. This produces concentrated U-235.

Usage of plutonium is preferable as when with uranium it requires 50kg, with plutonium it requires only 10kg. Moreover, Plutonium is useful in making lighter weapons and so it becomes easy to mount such weapons on missiles. The enrichment of nuclear weapon is not easy though as it requires accurate optimization. To serve the purpose of energy, enrichment of uranium should be 20-25%. If enriched 80-90%, uranium becomes eligible for making an effective nuclear bomb. The critical mass requirement is 50kg. Any less than above mentioned criteria, nuclear explosion is not possible.

Iran also develops ballistic missiles which also are not allowed to develop according to the deal. Ballistic missiles are powerful enough to travel from a continent to the other. They follow a trajectory and deliver one or more warheads to a predefined target. V-2 ROCKET developed by Nazi was the first powerful ballistic missile developed. The missile contains three phases: a. powered flight b. free flight c. Re-entry phase. The missile travels in the free flight time by the means of gravity and it enters the earth's atmosphere in the final phase. They can be launched from a fixed plane and modern techniques even allow the missile to be launched from a vehicle. E.g. submarines, ships, aircrafts, etc. For intercontinental ballistic missiles the highest height achieved during a free flight is 1150 km. They are powerful enough to travel at the speed of 5.5 km/s.

## 3. STORY OF URANIUM:

The number of gas centrifuges should be reduced to 6000 which initially was 19000. This makes a big throw back for making a nuclear weapon as gas centrifuges play a good role in nuclear enrichment. The technology should be switched back to old technology which prevailed in 1950s.

The problem was not only reducing the Iran's capability to work for a nuclear weapon program but something also and to be done about the stockpile which it already possessed. A reliable survey shows Iran as nation with 7500 kg of LEU. Under JCPOA, the stockpile will be reduced to massive 95%. It means possession of only around 300kg of LEU. There are two ways of achieving this:

- i. Diluting the possessed uranium
- ii. Shipping it out of the country.

Iran is a nation where enriching uranium is eternal. Hence, a decision also was to be made about the future capabilities of Iran to enrich uranium to carry out any nuclear program in future. JCPOA highlighted significant restrictions on research and development at all the plants. However, according to the plan, Tehran still can carry out research in technology of centrifuges but again that will be on a very small scale. The plan is designed such that it ceases the scope for Iran to enrich uranium for weapons for at least next 10-12 years. Even after that, Iran won't able to bring out sudden scale up in enrichment, all Iran can do is gradually, rather very slowly upgrade its enrichment capacity after 10 years. As for Arak plant, the production of plutonium will be very less and even if there is a small production, it would be shipped out of the country. Iran cannot, according to the plan reprocess the reactor without the acknowledgement of IAEA. Also, it cannot construct any new such heavy water reactor for next 15 years.

## 4. THE DEAL AND IAEA

The agreement is believed to be transparent and it did not provide any scope of cheating for Iran. The act will last for a decade or longer and will provide intense inspections for IAEA ensuring no weapon production in Iran. This deal is thus of great importance in terms of international security.

IAEA plays a very important role in the entire case. Iran also is a member of IAEA. It all started when Iran was looked upon as a nation pursuing nuclear weapon programs. Nevertheless, Iran constantly denied of pursuing any nuclear weapon program. It became hot when Iran did not permit inspections by experts from IAEA. This led to a tension situation between P5+1 nations and Iran which resulted in economic sanctions on Iran by the United Nations and also the P5 nations. The economy which was already about to fall from a height, got a rough push and economy of Iran came into a phase of never ending problems. The only possible way for Iran to stabilize the economy was to sign the nuclear deal, in which Iran not only has to stop nuclear program but also consumption can be done in terms decided by the P5 nations. The country had no option except signing this comprehensive deal; if they ever wished to come back in global economy. The deal is officially called JCPOA.

## 5. THINGS IRAN HAD TO IMPLEMENT ACCORDING TO THE DEAL:

Iran apparently seemed to oppose the deal but it soon learnt the danger it could face if the agreement was not made. Below are the benefits for Iran which eventually forced them to step back the opposition.

i. Reduce the large stockpile of LEU (Low Enriched Uranium) which is important to cut down the possibilities of making weapons significantly. The reduction should be around 97%. Also, for uranium to be considered as a weapon making component, it has enriched about 90% U-235.

ii. Supply of centrifuges which is a basic requirement for production to cut by 2/3, approximately from 19K to 6K.

iii. Natanz aka Kashan, central Iran FEP (Fuel Enriched Plant) should get no enrichment facilities.

iv. Convert Fordo, underground enrichment centre, to a "Nuclear physics and Technology centre. It is located at Qom, Iran's holiest town and it will be then used only for military research purpose. This plan won't allow the plant to possess any weapon creating material. The restrictions imposed on the plant will last for at least 15 years.

v. Arak, South Iran, a nuclear site that possesses Heavy Water Reactor that can produce weapon grade plutonium, should be redesigned and this reactor should be converted into Heavy Water Research Reactor with no weaponry by products (Figure 2). Heavy water reactor is nothing but a nuclear reactor wherein water is used as a moderator.



[Figure 2: Arak Heavy Reactor]

vi. To achieve only research work, core of the heavy reactor will be removed and filled with something like concrete.

vii. Answer IAEA when asked for clarification of issues, whether of present or of past.

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Iran is a nation where enriching uranium is eternal. Hence, a decision also was to be made about the future capabilities of Iran to enrich uranium to carry out any nuclear program. JCPOA highlighted significant restrictions on research and development at all the plants. However, according to the plan, Tehran had been given liberty to carry out research in technology of centrifuges but again that too on a very small scale. The plan was designed such that it ceased the scope for Iran to enrich uranium for weapons for at least 10-12 years. Even after that, Iran won't able to bring out sudden scale up in enrichment, all Iran can do is gradually, rather very

slowly upgrade its enrichment capacity after 10 years. As for Arak plant, the production of plutonium will be very less and even if there is a small production, it would be shipped out of the country. Iran cannot, according to the plan reprocess the reactor without the acknowledgement of IAEA. Also, it cannot construct any new such heavy water reactor for next 15 years.

## 6. IRAN'S BENEFITS AND URGENCY OF THE DEAL

Restricting Iran from producing a nuclear weapon is a need of not only P5 nations but also of many other developing and developed nations. It is because a small war with nuclear loaded Iran can crush the world peace. It will provoke other countries to walk on the same path. Humans will at last conclude: Science is a curse. United Nations is trying all possible steps to maintain world peace and if the deal is not executed as per the terms, it will be a big reason to worry for UN.

It is upon IAEA, which will be granted full access to the nuclear sites, to work transparently to avoid unwanted circumstances. Inspectors from IAEA will get all the access even in the non-declared sites to assure that there is no nuclear enrichment. However, in IAEA all the decisions will be taken by majority vote.

To us it is visible what Iran shows and there is a possibility that we might still be unaware about any nuclear plant which Iran might have developed but not revealed. It is a matter of international security. So, it is very important for IAEA to investigate past activities of Iran and dig out every rock. Relations between US and Iran have never been peaceful, it has only led to loss of lives and properties in thousands. It was important for IAEA to carry out intense investigations in Iran before the lifting of the sanctions else it could turn out into a nightmare. Soon after the agreement, P5 nations lifted their economic and financial sanctions. Iran once again got the benefits of international participation and also retained its electronic banking facilities. All the sanctions imposed by European nations. Iran is accused of numerous crimes which were diluted. As a matter of fact, Iran had no option but to sign the deal if it wanted its economy to survive. On the other hand, P5 nations are worried about the execution of the deal because if anything turns wrong in the deal, it will create political complexity. Also, critics fear that the sanctions lifted very soon will allow Iran to continue its nuclear program for at least sometime, which according to them is dangerous.

Being one of the largest reservoirs of oil, Iran urgently needed global participation to sustain. However, to add more burns to the injury, the conditions in global supply are turning even worse. It is experiencing historic lows and facing significant market challenges. Iran needs a powerful leap in terms of technology and strategy to compete in such worst conditions. To maintain its fiscal balance, it needs the price barrel at US \$130 while the price is rotating at around \$40. Hence, the situation will not turn helpful immediately after lifting of the sanction as it needs to fight and wait for recovery in global supply market.

### 5.1. Overall benefits for Iran according to the deal

Iran apparently seemed to oppose the deal but it soon learnt the danger it could face if the agreement was not made. Below are the benefits for Iran which eventually forced them to step back the opposition.

- i. All the sanctions will soon be lifted, i.e. in around five months and then Iran can step in global participation.
- ii. European Nations will remove banking and energy sanctions.
- iii. US will remove sanctions against domestic and foreign countries who do business with Iran.
- iv. UN will also lift its sanctions.

Russia, UK, Germany, Oman, Italy, South Korea, Saudi Arabia, Pakistan, Holy See and many other nations welcomed the deal and believed the deal as an historic agreement along with a path to peace.

U.S lifted the imposed sanctions on Iran and opened all the doors for trade. Meanwhile in Iran, 55 million people voted for Iran's Parliamentary elections.

## 7. REACTION TO THE DEAL:

Most of the countries were in the support of the deal, however, there were many negative reactions to the deal too. Some of the countries even believed the deal to be impeccable.

### 7.1 Iran's Reaction:

Abbas Aragchichi, Iran's deputy foreign minister, on Iranian news channel announced that the agreement does not stop Iran from exporting or importing weapons.

He quoted:

"We have told them in the negotiations that we will supply arms to anyone and anywhere necessary and will import weapons from anywhere we want and we have clarified this during the negotiations. If you want to have an agreement in which the sanctions imposed on us for weapons and missiles continue, then we will not agree. We will supply weapons, we do not feel shy. We will provide weapons to whomever and whenever we consider appropriate."

It is therefore not surprising when some of the nations and members of US Congress opposed the early lifting of the sanctions or rather lifting of the sanctions. Also, a mechanism is developed such to restore old sanctions if Iran tempers the decided terms.

Possible Military Dimensions is one of the major concerns of IAEA and Iran had to implement agreed set of canons.

President Hassan Rouhani cashed in on lifting of the sanctions and took maximum advantage for seeking votes. The conditions seemed to be in control since the sanctions were lifted unless IRGC (Iran's Islamic Revolutionary Grounds Corps) fired several ballistic missiles defying U.S. sanctions.



[Figure 3: Ballistic missile launch]

Commander of IRGC openly declared on Iranian television U.S sanctions will not stop them from developing ballistic missiles. Critics believe the declaration of developing ballistic missiles as a stepping stone for progress for Iran but defying sanctions is a sheer hypocrisy. Deep study of agreement, i.e. JCPOA shows a ban on the ballistic missiles tested by Iran with no complexity involved.

Iran always denied any link between its ballistic missiles and its disputed nuclear program, which is quite doubtful. Prophecy of Israel's prime minister seems to come true as Iran launched two missiles with phrase- ISRAEL MUST BE WIPED OUT. Though it is not seldom Iran has done this, but carrying out such tests despite agreement has created a lot of political tension amongst US, Iran and Israel. Israelites fear the danger they are in. However, Iranian officials quoted the test as to show that Iran could hit Israel. Iran neither agrees the violation of the deal.

Intentions of Iran of developing ballistic missiles seems firm.

## 7.2. INTERNATIONAL REACTION:

Most of the countries in the world welcomed the deal whole heartedly. Many considered the deal as a historical deal which will lay down the carpets of peace. Despite opposition of many Congress members in U.S., the JCPOA was implemented. They pointed the trust factor of Iran. They believe the norms as liberal and they should not be given any relief from economic sanctions as, according to them, by doing that Iran will be empowered to produce even more dangerous missiles. Hassan Rouhani, Iranian president considered the deal as a victory for Iran and he is expected to be elected as the president again.

Israel is completely unhappy with the deal while most of the nations have welcomed the deal whole heartedly. Benjamin Netanyahu, Israeli Prime minister, declared the deal as a mistake and feels that P5 nations have opened the path for Iran to conduct nuclear program by lifting the sanctions, which to him is early. According to him, economic relief will actually boost the nuclear weapon program. Israel is afraid of its existence. Surprisingly, Israel has not yet signed NPT, also, it is believed that Israel has an undeclared nuclear weapons program and it has not confirmed nor delay on the issue. Being on such grounds, there is no noteworthy point in considering Israel's opinion.

Members of Republican Party of US congress also opposed the lifting off the sanctions. However, president had opted to go for a veto power which declared the deal completely fine. The deal with Iran was not based on trust, but on verification.

- i. Framework for JCPOA was negotiated at Lausanne, Switzerland from 26 March to 2 April 2015.
- ii. On 14 July, a detailed agreement between the P5 nations and Iran was announced.

## 8. URGENT NEED OF THE DEAL:

Restricting Iran from producing a nuclear weapon is a need of not only P5 nations but also off many other developing and developed nations. It is because a small war with nuclear loaded Iran can crush the world peace. It will provoke other countries to walk on the same path. Humans will at last conclude: Science is a curse. United Nations is trying all possible steps to maintain world peace and if the deal is not executed as per the terms, it will be a big reason to worry for UN.

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## 8. CONCLUSION

To solve the political issues, U.S. and P5 nations should take some action and seeing it from humanitarian grounds, aggressive behavior of various nations and intentions of using nuclear energy for destruction puts the blessing of Science on back foot. Either these nations do not know the destruction these missiles can create or they know it too deeply. People in future will start cursing Science. It is rightly said: TECHNOLOGY UNLESS PROVEN INNOCENT IS GUILTY.

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