IRAN'S NUCLEAR POWER PERSPECTIVE

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INTRODUCTION

- **Electricity demand is increasing twice as fast as overall energy use and is likely to rise by more than two-thirds 2011 to 2035.**

- **Nuclear power is the most environmentally benign way of producing electricity on a large scale.**

- **The world will need greatly increased energy supply in the next 20 years, especially cleanly-generated electricity.**

Source: Word Nuclear Association (WNA)

RISING DEMAND FOR THE NUCLEAR ENERGY IN MIDDLE EAST & NORTH AFRICA

- **The Middle East & North Africa Nuclear Countries are including Iran, UAE, Saudi Arabia, Qatar, Kuwait, Yemen, Syria, Jordan, Egypt, Tunisia, Libya, Algeria, Morocco and Sudan.**

- **The pattern of energy demand in these countries are more like that of Europe, North America and Japan.**

Source: Word Nuclear Association (WNA)

RISING DEMAND FOR THE NUCLEAR ENERGY IN MIDDLE EAST & NORTH AFRICA (CONT'D)

- **These countries can be classified according to how far their nuclear power programmes or plans have progressed:**

  - ***Power reactors under construction: UAE;***
  - ***Contracts signed, legal and regulatory infrastructure well-developed or developing: Turkey;***
  - ***Committed plans, legal and regulatory infrastructure developing: Jordan, Egypt.***

DEVELOPMENT OF NUCLEAR POWER IN IRAN

	Type	MWe gross, net	Construction start	Commercial operation
Bushehr 1	VVER-1000/446	1000,915	1975, 1994	Sept 2013
Total (1)		915 MWe net		

Bushehr 1

- In 1957 a civil nuclear program was established under the US Atoms for Peace programme.

- In 1974 a target of 23,000 MWe of nuclear capacity to free up oil and gas for export. Preliminary agreements with Siemens KWU and Framatome for four nuclear power plants were signed.

DEVELOPMENT OF NUCLEAR POWER IN IRAN (CONT'D)

- **Construction of two 1,293 MWe (gross) PWR units was started 18 km south of Bushehr in Bushehr province on the Persian Gulf by Siemens KWU, based on the Biblis B reactor in Germany in 1975.**

- **After the Islamic revolution, work was abandoned early in 1979 with unit 1 substantially complete and unit two about half complete. The plant was damaged by Iraqi air strikes in 1984-88.**

DEVELOPMENT OF NUCLEAR POWER IN IRAN (CONT'D)

- **In 1992, the governments of the Islamic Republic of Iran and the Russian Federation signed a bilateral agreement on the completion of unit one of BNPP.**

- **A 1000 (MW) VVER type nuclear power reactor is operating in Iran, after many years construction, and a second is planned.**

DEVELOPMENT OF NUCLEAR POWER IN IRAN (CONT'D)

Bushehr 2,3

	Type	MWe gross	Construction start	Commercial operation
Bushehr 2	AES-92, VVER-1000	1057	2016	2023
Bushehr 3	AES-92, VVER-1000	1057	2018	2025

Makran

	Type	MWe gross	Construction start
Makran 1	Chinese	100	2018
Makran 2	Chinese	100	?

DEVELOPMENT OF NUCLEAR POWER IN IRAN (CONT'D)

Darkhowin NPP

	Type	MWe gross	Construction start	Commercial operation
Darkhowin	LWR, IR-360	360		

The Darkhowin Nuclear Power Plant is a planned nuclear power plant located about 70 kilometers south of Ahvaz, Iran at the Karun river.

The plant detailed design is under preparation.

IRAN NUCLEAR AGREEMENT (JCPOA)

- **The Joint Comprehensive Plan of Action (JCPOA) known commonly as the Iran deal, is an international agreement on the nuclear program of Iran reached in Vienna on 14 July 2015 between Iran, the P5+1***

***The five permanent members of the United Nations Security Council-China, France, Russia, United Kingdom, United States- plus Germany, and the European Union.**

JCPOA (CONT'D)

- **On January 2016, the parities (E3/EU+3) started to implement JCPOA. After JCPOA went into effect, all nuclear-related sanctions imposed on Iran by the European Union, the UN Security Council and the US were lifted.**

JCPOA (CONT'D)

- **Following the implementation of the JCPOA, European countries, as well as advanced nuclear Asian states such as Japan, China and South Korea are expected to cooperate with Iran to enhance its nuclear energy capacities.**

JCPOA IMPACT ON IRAN NUCLEAR PROGRAMME

1. Iran-EU Cooperation

- **The EU has a special responsibility as the leader of the negotiations that have produced the JCPoA. The annex III of the document provides for cooperation in the field of nuclear safety which covers, inter-alia:**

JCPOA IMPACT ON IRAN NUCLEAR PROGRAMME

1. Iran–EU Cooperation (cont'd)

a. **Support to the Iran Nuclear regulatory authority (INRA);**

- ***To jointly review the regulatory framework in Iran against the EU and international standards, taking into account the lessons learned from the Fukushima Daichii accident;***
- ***To enhance technical capacity in the development of Probabilistic and Deterministic Safety Assessment;***
- ***To implement the European Stress Tests at the Bushehr Nuclear Power Plant with the NPP operator and support the review of the stress tests report by the Iranian Nuclear Regulatory.***

JCPOA IMPACT ON IRAN NUCLEAR PROGRAMME (CONT'D)

1. Iran–EU Cooperation (cont'd)

b. **Creation of a Nuclear Safety Centre;**

- ***The intention of the Nuclear Safety Centre (NSC), is to support and facilitate technical and professional training and exchange of lessons-learned for reactor and facility operators, regulatory authority personnel and related supportive organisations;***

- ***The establishment and development of the NSC has also a future role to function as the TSO for INRA.***

JCPOA IMPACT ON IRAN NUCLEAR PROGRAMME (CONT'D)

1. Iran–EU Cooperation (cont'd)

c. **Training and tutoring activities;**

Participation of Iranian staff in training courses and tutoring at EU organisations through scientific visit and on-the job training in the following topics:

- ***Environmental Monitoring;***
- ***Security-related issues for NPPs, e.g. during fuel handling;***
- ***Joint-inspection during operation of NPPs;***
- ***Nuclear safeguard and non-proliferation.***

JCPOA IMPACT ON IRAN NUCLEAR PROGRAMME (CONT'D)

1. Iran-EU Cooperation (cont'd)

d. **Other issues;**

- **To supply of valid codes, instruments and equipment related to nuclear safety;**
- **To co-operate in the civil nuclear field include joint fission and fusion research activities, as well as possible regional/international nuclear safety conference and nuclear business forum;**
- **To enhance and strengthen Iran's domestic emergency preparedness and severe accident management capability.**

JCPOA IMPACT ON IRAN NUCLEAR PROGRAMME (CONT'D)

2. Iran–China Cooperation

- **Redesigning and modernization of the Arak heavy water reactor;**
- **Construction of two 100- Megawatt power plants (ACP-100).**

JCPOA IMPACT ON IRAN NUCLEAR PROGRAMME (CONT'D)

3. Iran-Spain (CSN) Cooperation

- **Exchange of knowledge and experience in nuclear regulatory activities through:**
  - **Organizing joint inspection programs;**
  - **Collaboration in updating INRA regulations in light of lessons learned from Fukushima accident and also best practices of CSN;**
  - **CSN organizes advanced training on techniques of safety review of regulatory documents.**

JCPOA IMPACT ON IRAN NUCLEAR PROGRAMME (CONT'D)

3. Iran-Spain (CSN) Cooperation

- **Collaboration of CSN in organizing an international conference on nuclear safety and security (in 2017);**

- **Cooperation in development of nuclear preparedness and response programs and participation in drills;**

JCPOA IMPACT ON IRAN NUCLEAR PROGRAMME (CONT'D)

3. Iran-Spain (CSN) Cooperation

- **Cooperation in establishment and mobilization of an international nuclear safety center in Iran according to the Annex 3 of JCPoA;**

- **Establishment of a joint executive committee to develop the work plans and any necessary arrangements for the cooperation.**

JCPOA IMPACT ON IRAN NUCLEAR PROGRAMME (CONT'D)

4. Iran-SWISS Cooperation

- **Cooperation in strengthening nuclear safety, fostering regulatory exchange on nuclear regulatory oversight issues in the following areas:**
  - **Design, siting, construction, commissioning, operation, and decommissioning of nuclear installations;**
  - **Regulatory framework, legislation, regulations, licenses, regulatory codes, standards, criteria and guides;**
  - **Technical reports and nuclear safety assessments, including those related to radiological safety;**

JCPOA IMPACT ON IRAN NUCLEAR PROGRAMME (CONT'D)

4. Iran-SWISS Cooperation (CONT'D)

- **Nuclear incident and accident reports, and, in particular, information concerning any event that has a major radiological significance and the remedial actions undertaken in response;**
- **Safety-related research in connection with licensing and regulatory control of nuclear installations;**
- **Radiation protection and physical protection of nuclear material;**
- **Storage, discharge, treatment and regulation of radioactive waste management;**

JCPOA IMPACT ON IRAN NUCLEAR PROGRAMME (CONT'D)

5. Iran-Japan Cooperation

- **Planning to Cooperate with INRA in establishment a nuclear emergency monitoring & response center in Iran;**
- **Planning to Provide training courses for INRA's experts to get familiar with the environmental radiation monitoring telemetry system;**
- **Planning for participation of INRA's experts in environmental monitoring and emergency drill.**

JCPOA IMPACT ON IRAN NUCLEAR PROGRAMME (CONT'D)

4. Iran-Japan Cooperation (CONT'D)

- **Planning to Cooperate with Iran in providing training courses for INRA's experts in the field of:**
  - **Severe accident assessment;**
  - **Risk assessment;**
  - **Earthquake resistance;**
  - **Radiation measurement and radiation protection.**

CONCLUSION

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