

France's Efforts to Promote NPP Exports and the Implications on the Role of Nuclear Regulatory Body

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1. Introduction

The global society facing sky-rocketing oil prices, global warming effects, and increased demand for electricity recognizes the comparative advantages of nuclear energy in terms of environmental impact and economic efficiency over the other energy sources of current use. Approximately 300 nuclear power plants (NPPs) expect to be constructed until 2030 worldwide. Accordingly, the global market size of nuclear power industry becomes scaled up to the extent of \$75 billion on the assumption that the construction of one reactor costs around \$2.5 billion. The nations in possession of advanced nuclear technology such as the U.S., France, Japan, etc not only recognized an abounding profitability in nuclear industry and anticipated nuclear renaissance but also prepared long before whatever necessary to expand their nuclear programs beyond their domestic boundaries. Amongst those nations, it seems to be France that has unfolded a remarkable array of government-led activities to export Evolutionary Pressurized Reactors (EPRs) under the cooperation of President, relevant government administration, utilities even a regulatory body. The omni-directional activities of France and its implications are presented in this paper.

2. Standpoint of France on Nuclear Industry

Since the first oil shock of 1973, France has taken a government-driven nuclear program and now relies upon nuclear energy for 76.8% of its domestic electricity generation, and even exported a total of 11 Framatome-type NPPs and made several contracts of EPR abroad. To this end, as well as stability and environment-friendliness, nuclear energy has been brought to the fore in France for its economic aspect that the nuclear business is a higher value-added and technology-intensive business that creates jobs and boosts a national economy through an export of nuclear technology to foreign countries. The present government of France concentrates its effort on and reveals straightforwardly an intention of nuclear export.

3. Assigned Roles Taken for Nuclear Export

The French approach to nuclear export is the most comprehensive and long-term based. All the relevant organizations from the government, utility, vendor to regulators have shown collective efforts and taken actions for more than a decade under the national

nuclear export initiative as stated in the following paragraphs.

3.1 President

Nicolas Sarkozy, the current president of France, is known for his pragmatic diplomacy that ties diplomatic relations to economical benefit. Bilaterally, he tried to promote amicable relations with Middle Eastern nations. As an exemplary outcome, France accomplished with UAE an agreement on the nuclear technology cooperation and a contract on the construction of two EPRs. Sarkozy visited China in November 2007 and made a deal to supply two EPRs. France stretches out its cooperation scope even to the nation, India that does not join the Non-proliferation Treaty.

Activity on a multilateral level is an establishment of Union for the Mediterranean (UM) which was firstly suggested by Sarkozy and includes all member states of EU and 16 nations in Mediterranean, Middle Eastern and Northern African areas. UM is understood as a foothold for France to facilitate its nuclear export.

3.2 Areva: Global Company as a Nuclear Vendor

Areva, the French government-owned company, started from Framatome, has undergone organizational changes through several M&As, and now presents itself into the world as a multinational one-stop service company providing all the nuclear-relevant services from nuclear fuel supply, NPP design & construction, operation & maintenance, nuclear fuel cycle(uranium mining, conversion, enrichment, spent fuel reprocessing & recycling) to electricity transmission and distribution. Attributable to these functions and an organizational scale, Areva is regarded as highly attractive to the nations both with and without basic nuclear and electricity infrastructure.

Areva is now under privatization process, which enables Areva to be more efficient and effective in its international business with more sufficient financing.

Also, for further market share in PWR NPP, there has been a strategic cooperation between Areva and Japanese company (Mitsubishi Heavy Industries, LTD) through establishing a joint company, ATMEA, to proceed development, marketing, licensing and sales of ATMEA 1. Additionally, Areva extends its stride to the U.S. by establishing a local subsidiary, Areva Inc. and by establishing a joint company, UniStar Nuclear with the U.S. electricity company, Constellation Energy Group. EdF, a public utility in France is in a great support of Areva in EPR construction project at home

and particularly abroad by establishing joint stock companies with local subsidiaries.

3.3 Atomic Energy Commission (CEA)

CEA announced its plan to establish Agency France Nuclear International (AFNI) within itself to inform the international society of the excellence and safety of French nuclear technology and to support the nations hoping to introduce NPPs by developing legal and technological infrastructure and human resources.

3.4 Nuclear Regulators

From 1990s, Nuclear Safety Authority (ASN) has involved in EPR reactor design by reviewing the detailed design reports and introducing safety improvements to the design and the manufacturing of the EPR. It is understood that this involvement of ASN upholds the reliability of safety level of EPR design.

Furthermore, on a premise that nuclear safety takes precedence over any other NPP introduction activities, ASN in France has prepared long before to improve the recognition level of French nuclear safety in international society. ASN newly established itself in November 2006 as an independent administrative authority on the basis of the law on ‘transparency and security in the nuclear field (TSN)’ enacted in June 2006. The subsequent receipt of the Integrated Regulatory Review Service (IRRS) provided by IAEA was a hallmark that the French nuclear safety and regulation is equivalent to the international top level. As one step further, ASN announced a ‘Position Report’ saying that it will assist countries which are new to nuclear power in developing necessary legislative and regulatory framework, training personnel, and performing nuclear reactor regulation, construction site inspection and operation regulation. It also states that the support would be given to a nation familiar with French technology. IRSN, a technically supporting organization to ASN recently forwarded a ‘Service Proposal’ which introduces a series of service items of essential nuclear and regulatory technologies.

4. Support to the nations hoping to introduce NPPs

France has prepared a supporting program to establish the infrastructure (particularly human resource) for introducing NPPs to those nations new to nuclear power. This program is characterized by a step-by-step plan covering from feasibility study, procurement, construction to operation and management. Accordingly, the government, the utility (EdF), the vendor (Areva) and a regulatory body (ASN) collaboratively take part in this supporting program. Figure 1 shows the education program and figure 2 shows a detailed manpower development action plan.

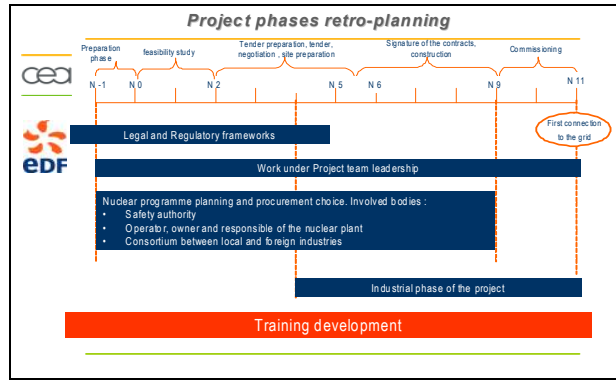


Figure 1. Step-by-Step Education & Training Schedule

The other disposition of this program is that the plan is customized to the receiving nation by matching the number & the type of NPPs (and sites) and the procurement method as well as its socio-cultural context including education system.

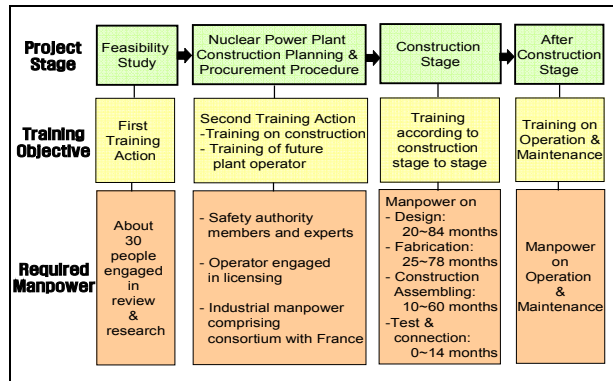


Figure 2. Step-by-Step Required Manpower

5. Conclusions

Recent nuclear export outcomes that France has shown have come from a long-term and strategic cooperation among relevant organizations. This casts a point of significance to our nation also desiring for nuclear export. First, a comprehensive strategy at a national level needs to be drawn out and implemented. Second, the support on infrastructure development works as a strong incentive to the nation new to nuclear power and as the first step to export nuclear power by clearing off the international concerns about nuclear safety. Last, the support of the human resources particularly needs to be preceded before the introduction of nuclear power. Helping new entrants with education and training on safety and regulation would be the most cost-effective approach to the export of NPPs.

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