

# NUCLEAR REGULATION IN NEW JURISDICTIONS: THE UNITED ARAB EMIRATES IN COMPARATIVE PERSPECTIVE

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## Abstract

This paper examines the creation of the United Arab Emirates Federal Authority for Nuclear Regulation (FANR). It highlights the role of foreign assistance from the International Atomic Energy Agency and other national nuclear regulators. But it also identifies the steps that FANR has taken to increase the nuclear expertise of native Emirati. FANR faces several challenges: independence from nuclear industry and government, and blending multiple foreign and indigenous safety cultures and systems into one organization. Finally, this paper offers lessons from FANR that could be applied to other new entrants in nuclear energy.

*Keywords:* FANR, Nuclear Regulation, Nuclear Energy

## 1 INTRODUCTION

There are 31 countries that currently operate a nuclear power reactor around the world [1]. The United Arab Emirates (UAE) will be number 32 as they are constructing three APR-1400 reactors at the Barakah site. These reactors, which cost a combined \$20 billion, will come online by 2020. Even though the UAE has energy security with its large deposits of oil and natural gas, it still has reasons to pursue nuclear energy. An obvious reason is the increased demand for electricity, especially in its growing aluminum industry, in the UAE. In addition, the UAE wants to stop using its oil and natural gas resources for generating electricity; it would rather export them to acquire foreign currency. The UAE also plans on exporting some of its surplus electricity to Saudi Arabia. A nuclear reactor can also be used for water desalination plants, which are critical in areas that lack freshwater resources such as the desert

country of the UAE. Finally, developing nuclear energy is a matter of national prestige for the Emirates [2].

Introducing nuclear energy into a new jurisdiction is a complex process. In the case of the UAE, they had begun to investigate the possibility of nuclear energy since the early 2000s. This involved numerous steps [3]. In 2003, the UAE ratified a nuclear safeguards agreement with the International Atomic Energy Agency (IAEA) [4]. In 2006, the Gulf Cooperation Council (GCC) – an international organization that included Kuwait, Saudi Arabia, Bahrain, the UAE, Qatar, and Oman – commissioned a study on the peaceful uses of nuclear energy. In February 2007, the GCC agreed with the IAEA to cooperate on a feasibility study for a regional nuclear power and desalination program [5]. In April 2008, the UAE produced a white paper announcing its intention to evaluate nuclear energy [6]. In October 2009, it passed

domestic legislation – required as part of its bilateral nuclear cooperation agreement with the United States - to permanently forego the acquisition of uranium enrichment and plutonium reprocessing capabilities [7]. In 2009, the Federal Authority for Nuclear Regulation (FANR) was created. In that same year, the Emirates Nuclear Energy Corporation (ENEC), a state-owned entity, was formally established. The ENEC invited bids from nuclear vendors to build the UAE's first set of nuclear reactors, ultimately choosing a consortium led by the Korea Electric Power Corporation (KEPCO) in December 2009. Construction began in 2012 making the UAE the first new country to build a nuclear power plant in 27 years.

Of all of these steps, the most critical one was, as noted in the UAE's nuclear policy, "the establishment of an independent, vigilant and effective regulatory authority is a cornerstone for any stable, credible, safe and secure nuclear program" [6]. A robust nuclear regulator is necessary to ensure the safety of nuclear energy, the physical security of reactors, preventing possible proliferation to nuclear weapons, and implementing a country's international commitments. A properly functioning nuclear regulatory body also helps build and maintain a safety culture within a country. This is why, in a special edited volume on new entrants and nuclear energy, Steven Miller and Scott Sagan emphasized that "for nuclear energy programs to be developed and managed safely and securely" there needs to be "a strong degree of regulatory competence" [8].

The UAE is seen by many observers as "the model for nuclear newcomers" [9]. Therefore, this paper conducts a case study of FANR. In the process, it places FANR in the context of other jurisdictions where nuclear regulators have been operating for many decades and provides lessons for

countries that are thinking of creating their own nuclear regulatory body.

## **2 METHODOLOGY**

This paper's methodology involves a qualitative analysis of FANR's key documents, UAE legislation, and documents from other nuclear regulators. This primary source evaluation is supplemented by elite interviews with key members of FANR, ENEC, UAR government officials, and individuals who assisted FANR in its creation.

## **3 CREATION OF FANR**

The roles, responsibilities, and enforcement powers that FANR was granted are very similar to more established nuclear regulatory agencies such as the Canadian Nuclear Safety Commission (CNSC) [10] and the U.S. Nuclear Regulatory Commission (NRC) [11]. FANR "shall determine all matters relating to the control and supervision of the Nuclear Sector in the State, particularly those related to Safety, Nuclear Safety, Nuclear Security, Radiation Protection, Safeguards and implement any obligations under the relevant international treaties, conventions or agreements entered into by the State" (Article 5). FANR licenses all nuclear facilities across the entire lifecycle: site selection, site preparation, facility construction, facility commissioning, facility operation, facility closure, and facility decommissioning (Article 25). As a quasi-judicial body, FANR has punishments at its disposal for non-compliance with its regulations and nuclear accidents. For example, FANR can issue fines (and even prison terms), suspend or even revoke licenses. FANR must also publicize all of its licensing decisions in order to be transparent to the public (Article 9). Licensees that produce nuclear waste are also required to contribute to trust funds for a waste

management facility and decommissioning of the plant (Article 42) [7].

As a brand new organization, FANR relies heavily on foreigners who have substantial nuclear regulatory experience. For example, FANR's Director General is Christer Viktorsson who was Deputy Director at the Swedish Nuclear Safety Authority for over a decade [12]. Other senior managers have experience at the CNSC, NRC, Australian Radiation Protection and Nuclear Safety Agency, and the Czech State Office for Nuclear Safety. FANR has also signed nine bilateral arrangements with foreign regulators [13].

This foreign flavour is not just at the top, but permeates the entire FANR. In total, FANR has over 180 employees from 23 countries (including the UAE) with prior experience in nuclear regulation. 57% of FANR's workforce are Emirati, but too many of them are in the non-technical areas such as communications and finance. Viktorsson wants FANR to get Emiratis "trained to take on key positions" in "all areas of operation" [14].

FANR's relationship with the IAEA is also indispensable. This is because the IAEA has "a central role with respect to nuclear safety and security" [15]. For new entrants, the IAEA has an "Integrated Strategy for Assisting Member States in Establishing/Strengthening Their Nuclear Safety Infrastructure" [16]. The UAE signed an Integrated Work Plan with the IAEA for the implementation of its national nuclear program [17]. There have already been two sustained IAEA review missions to the UAE to inspect its regulatory framework. The most recent in February 2015, found that FANR had "strengthened its regulatory oversight and made significant progress" since the initial review in 2011 [18].

As a new entrant into the world of nuclear energy, FANR obviously relied heavily on foreign assistance in getting off the ground. However, the sustainability of the organization – and the UAE's nuclear sector as a whole – can only be achieved through developing an indigenous nuclear capacity. To this end, "FANR has recruited a core team of experienced international personnel with sound training and mentoring backgrounds to work closely with the skilled cadre of Emirati personnel" [19]. For example, part of KEPCO's contract is to operate the reactors for 60 years and provide training for Emiratis. FANR has also established links with its universities to train more nuclear engineers. For example, it has internship programs with both Khalifa University and Sharjah University and is partnering with Abu Dhabi University's new engineering college. At the IAEA's 2014 General Conference, John Loy, FANR's Deputy Director, discussed how the culture of the nuclear industry needed to change with regards to knowledge management. FANR's challenge has been to transfer knowledge from "experienced and skilled expats to a young generation of Emiratis" [20].

#### **4 FANR CHALLENGES**

FANR faces several potential challenges. Most importantly, it needs to establish and maintain its independence from both government and nuclear industry [21]. As the revelations about the collusion between Japanese regulators and industry which were exposed in the aftermath of the Fukushima nuclear accident have shown, this can be difficult even within mature liberal democracies [22]. But the challenge is even tougher in a nondemocratic country such as the UAE.

FANR did make independence one of its core values. It emphasized the independence was "fundamental to achieve and maintain public and international

acceptance of a civilian nuclear power program.” It operationalized this through an appointments process that included “clear and limited removal criteria,” budgets that would “not be subject to undue control by external bodies,” and a government reporting structure that avoided “direct Ministerial control over nuclear safety regulation” [23]. One way that FANR is already independent from the nuclear industry is that FANR and ENEC were created separately. In many countries, there is often a cross-over in personnel between the nuclear industry and the regulator due to similarity in technical knowledge. But, so far, this has not been the case in the UAE.

But there are some signs of a lack of budgetary independence. With the first Barakah unit only 75% built, FANR is facing some budget pressures. This at a time when it should be adding staff. As a UAE newspaper reported, “FANR executives said privately that budget cuts would slow down the programme at some point” [24].

Other potential tests of FANR’s independence will occur in the future. For example, if a dispute emerges between FANR and ENEC and/or the government over the safety of the Barakah reactors. Already, there are questions being asked about the safety of some valves that caused an explosion at a Korean nuclear plant. These same valves are to be deployed at the Barakah site [24]. Another test will be when (or if) anti-nuclear organizations start to take shape among the UAE public. How will FANR address their concerns?

A final challenge is how FANR handles its unique blend of different safety cultures and systems that it has compiled from around the world. Bringing in foreign expertise is, at once, FANR’s greatest strength and potentially a liability. However, as Richard Meserve reminds us, a new

entrant’s nuclear safety system “must operate within each nation’s legal, economic, and social culture; adaptations of regulatory systems to fit local conditions are probably necessary in any event” [25].

FANR, as a former ENEC executive stated, “is a blend of US and western European philosophies in terms of the plant safety and emergency response procedures.” Add to that is the fact that “you are going to operate the plant with systems and processes that were developed in Korea.” Clearly, “having a multinational, multicultural and multilingual workforce certainly adds a layer of complexity to the UAE project. A great deal of effort has been placed on trying to address potential issues in this area, and it will have to continue to be an area of emphasis for the foreseeable future” [24].

## 5 FANR’S LESSONS

What lessons from the FANR case could be used to help other new nuclear jurisdictions develop their own regulatory bodies? First, any new nuclear regulator should utilize the technical cooperation offices of the IAEA. Second, they should recruit experienced regulators from countries with established nuclear regulatory regimes. Foreign assistance is a necessary first step, but it is insufficient in the long run. Therefore, the third lesson is to establish a comprehensive and well-funded domestic training programs for its own nationals.

A final lesson involves the expansion of the international regulation of nuclear safety. After all a nuclear accident anywhere in the world affects the entire nuclear sector. For example, Findlay has recommended that the world’s regulatory bodies and IAEA should create “a truly global body of regulators that would meet regularly” [26]. This could be similar to how the World Association of Nuclear Operators was created in the aftermath of the Chernobyl

accident. For his part, Meserve recommends strengthening the ability of the IAEA to conduct safety inspections of nuclear power plants, just like it does for non-proliferation purposes [25].

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## REFERENCES

- [1] IAEA, “Operational and Long-Term Shutdown Reactors,” (5 September 2015). Accessed at <https://www.iaea.org/PRIS/WorldStatistics/OperationalReactorsByCountry.aspx>
- [2] Allison Macfarlane, “Where, How, and Why Will Nuclear Happen? Nuclear “Renaissance” Discourses from Buyers and Suppliers,” in Adam N. Stulberg and Matthew Fuhrmann, eds., *The Nuclear Renaissance and International Security* (Stanford University Press: Stanford, California, 2013), 50-72.
- [3] Bryan R. Early, “Acquiring Foreign Nuclear Assistance in the Middle East,” *The Nonproliferation Review* 17/2 (2010), 259-280
- [4] The UAE had previously ratified the Nuclear Non-Proliferation Treaty (1995) and would subsequently accede to the IAEA’s Additional Protocol in 2008.
- [5] Laura El-Katiri, “The GCC and the Nuclear Question,” *Oxford Energy Comment* (December 2012).
- [6] UAE, *Policy of the United Arab Emirates on the Evaluation and Potential Development of Peaceful Nuclear Energy* (2008).
- [7] UAE, *Concerning the Peaceful Uses of Nuclear Energy*. A federal law by decree No. 6 of 2009 (2009), Article 2.
- [8] Steven E. Miller and Scott D. Sagan, “Nuclear power without nuclear proliferation?” *Daedalus* 138/4 (Fall 2009), 7-18.
- [9] Nuclear Threat Initiative, “United Arab Emirates,” (April 2015). Accessed at <http://www.nti.org/country-profiles/united-arab-emirates/>
- [10] Canada, *Nuclear Safety and Control Act* (current to August 30, 2015). Accessed at <http://laws-lois.justice.gc.ca/eng/acts/N-28.3/page-2.html#h-5>
- [11] United States Nuclear Regulatory Commission, *Nuclear Regulatory Legislation* (September 2013). Accessed at <http://www.nrc.gov/about-nrc/governing-laws.html#energy>
- [12] FANR, “Senior Management Profiles,” (2015). Accessed at <https://www.fanr.gov.ae/En/AboutFANR/Pages/Senior-Management-Profiles.aspx>
- [13] FANR, “International and Domestic Cooperation,” (2015). Accessed at <https://www.fanr.gov.ae/En/AboutFANR/Pages/International-Domestic-Cooperation-.aspx>
- [14] Quoted in Caline Malek, “More Emiratis needed for UAE nuclear industry, says new chief,” *The National* (7 July 2015). Accessed at <http://www.thenational.ae/uae/more-emiratis-needed-for-uae-nuclear-industry-says-new-chief>
- [15] IAEA, “Amendment to the Convention on the Physical Protection of Nuclear Material” (2011). Available at: [www.iaea.org/Publications/Documents/Conventions/cppnm\\_amend\\_status.pdf](http://www.iaea.org/Publications/Documents/Conventions/cppnm_amend_status.pdf).
- [16] IAEA, “Initial Progress in the Implementation of the IAEA Action Plan on Nuclear Safety.” (2011). Report by the Director General. GOV/INF/2011/15, 6.
- [17] IAEA, “United Arab Emirates and IAEA sign an Integrated Work Plan (IWP) to support the implementation of the national nuclear power programme,” (3 June 2013). Accessed at <https://www.iaea.org/technicalcooperation/R>

egions/Asia-and-the-Pacific/News/Archive/06062013-UAE-IWP.html

[18] IAEA, "IAEA Mission Concludes Review of United Arab Emirates Regulatory Framework for Nuclear Safety," (February 8, 2015). Accessed at

<https://www.iaea.org/newscenter/pressreleases/iaea-mission-concludes-review-united-arab-emirates-regulatory-framework>

[19] FANR, "FAQs," (2015). Accessed at <https://www.fanr.gov.ae/En/AboutFANR/FAQs/Pages/default.aspx>

[20] IAEA, "The Challenge of Managing Nuclear Knowledge," (24 September 2014). Accessed

at <https://www.iaea.org/newscenter/news/challenge-managing-nuclear-knowledge>

[21] Timothy P. Matthews and Esther K. Park. "Regulatory independence and accountability: a survey of international and nuclear regulatory regimes," *International Journal of Nuclear Law* 4/1 (2013), 5-19.

[22] Richard Tanter, "After Fukushima: A survey of corruption in the global nuclear power industry," *Asian Perspective* 37/4 (2013), 475-500.

[23] William Travers, Director General (designate), FANR, "Building a New Nuclear Safety Regulatory Authority for the United Arab Emirates," (11 March 2009).

Accessed at [www.nrc.gov/public-involve/conference.../travers-slides.ppt](http://www.nrc.gov/public-involve/conference.../travers-slides.ppt)

[24] Anthony McAuley, "UAE nuclear project enters critical phase," *The National* (7 July 2015). Accessed at

<http://www.thenational.ae/business/energy/uae-nuclear-project-enters-critical-phase>

[25] Richard A. Meserve, "The global nuclear safety regime," *Daedalus* 138/4 (Fall 2009), 100-111.

[26] Trevor Findlay, *Unleashing the Nuclear Watchdog: Strengthening and Reform of the IAEA* (CIGI: Waterloo, ON, Canada, 2012).