United Arab Emirates - 2025

PREAMBLE AND SUMMARY

This report provides information on the status and development of the nuclear power programme of the United Arab Emirates (UAE), including factors related to effective planning, decision making and implementation of the nuclear power programme that together lead to safe and economical operation of nuclear power plants.

The CNPP summarizes organizational and industrial aspects of the nuclear power programme and provides information about the relevant legislative, regulatory and international framework of the United Arab Emirates (UAE).

Barakah Nuclear Power Plant, the UAE's first power station, consists of four APR-1400 nuclear reactors. Barakah Unit 1 entered commercial operation in April 2021, followed by Unit 2 in March 2022, Unit 3 in February 2023 and Unit 4 in September 2024. The four operational units produce 40 TWh of clean electricity annually, and will do so for at least 60 years to come.

1. COUNTRY ENERGY OVERVIEW

1.1. ENERGY SYSTEM

Oil and gas have historically been the dominant sources fueling the country's economy. The United Arab Emirates has the world's seventh largest proven oil reserves and the sixth largest natural gas reserves, making the country a critical partner and responsible supplier in global energy markets. Despite being rich in hydrocarbons, the UAE began its path toward energy diversification with the UAE Energy 2050 plan, which clearly defines a country-wide strategy in which clean energy plays the largest role. Adding more clean energy into the mix also means a decreased reliance on natural gas, which accounts for 71% of the UAE's primary energy. The country's energy consumption growth has slowed in recent years compared to the increases in 2014 and 2015, but demand continues to increase in line with population and economic growth. The UAE's energy strategy for 2030 aims for an energy mix of 20% renewable energy, 9.5% nuclear energy, and 70.5% natural gas.

1.1.1. Energy Policy

The UAE Energy 2050 plan emphasizes the delivery of clean and affordable energy to decrease carbon emissions, maximize energy productivity and the stimulation of further economic growth and to build a future beyond oil. The UAE Ministry of Energy and Infrastructure is the federal authority, which supervises the achievement of the security of energy supplies in a sustainable manner. It also works on building a strong foundation of regulations to govern the energy sector and reduce greenhouse gas emissions. These regulations are enforced with the local government bodies in charge of energy affairs.

The Emirate of Abu Dhabi regulates its energy sector by the Department of Energy (DoE). Abu Dhabi is ushering in a more diversified landscape featuring the region's NPP, renewable energy and carbon capture utilization techniques. Dubai Electricity and Water Authority (DEWA) for the Dubai Emirate has committed to a diversified energy mix with smart technologies that will deliver 75% of the city's energy demand through clean energy by 2050. To achieve these targets, DEWA is increasing the use of renewable energy and carbon capture utilization techniques. In line with the rest of the Emirates, Sharjah Electricity, Water and Gas Authority (SEWGA) for the Sharjah Emirate and Etihad Water & Electricity (for the four Northern Emirates: Ajman, Umm Al Quwain, Ras Al Khaimah and Fujairah) are planning possible options for using renewable energy too, such as solar energy or pumped hydro systems, in addition to its bountiful hydrocarbon deposits.

Throughout 2007, the Government of the UAE evaluated future energy sources options and studied a potential role of nuclear energy in the UAE's future energy strategy. The energy studies concluded that nuclear energy has the potential to play a major role

in meeting the growing energy needs in the UAE; it has been estimated that the domestic demand for power will continue to grow by 9% annually. Based on the studies, the Government developed the "*Policy of the United Arab Emirates on the Evaluation and Potential Development of Peaceful Nuclear Energy*" (the Nuclear Policy), which was adopted by the UAE Cabinet of Ministers and published during April 2008.

The development of the Nuclear Policy required an in-depth study of best international practices; a broad consultation process within the Government of the UAE, as well as with foreign and international stakeholders, such as the IAEA; and the determination of guiding principles for the development of the peaceful nuclear energy in the UAE. The Nuclear Policy outlines the role of nuclear energy in the UAE's energy strategy and the UAE's approach to civilian nuclear power. Most importantly, the policy outlines its commitment to the highest standards of safety, security and non-proliferation. At that time, several key strategic choices by the Government were also reflected in the Nuclear Policy, which were to forgo domestic enrichment and reprocessing of nuclear fuel.

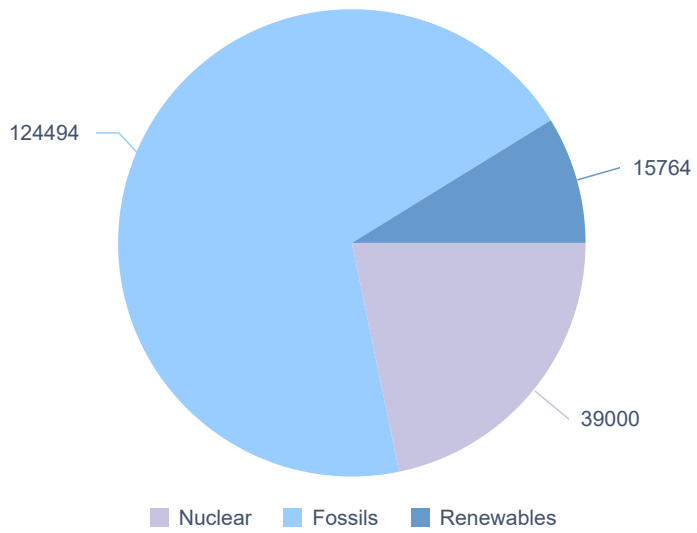
1.1.2. Energy Statistics

TABLE 1: INSTALLED CAPACITY AND ELECTRICITY PRODUCTION BY SOURCE

Energy Sources [Gross]	Electricity Supplied		Installed Capacity	
	[GW(e)*h]	Share (%)	[GW(e)]	Share (%)
Total	179257.81		47089	
Nuclear	39000	21.8	5560	11.8
Fossils	124493.73	69.4	34729	73.8
---Coal (hard coal, lignite)	0	0		
---Gas	124493.73	69.4	34729	73.8
---Oil				
Renewables	15764.08	8.8	6791	14.4
---Solar(PV)	14271.58	8	6451	13.7
---Waste	1272.5	0.7	230	0.5
---Wind	220	0.1	110	0.2
Total				
Nuclear				
Fossils				
---Coal (hard coal, lignite)				
---Gas				
---Oil				

Renewables
---Solar(PV)
---Waste
---Wind
Data as of 2024-12-31 from IAEA Power Reactor Information System

CHART 1: ELECTRICITY PRODUCTION BY SOURCE



Electricity Supplied [GW(e)*h]

TABLE 2: ENERGY CONSUMPTION

Final Energy consumption [PJ]					
Final Energy consumption [PJ]	2005	2010	2015	2020	2024
Coal, Lignate and Peat	7	27	71	89	30
Petroleum products	386	528	753	752	835
Natural gas	515	1058	1448	1118	1361
Biomass and wastes	1	2	2	2	2
Electricity	194	317	392	425	557
Heat	0	0	0	0	0
Total	1103	1932	2666	2386	2785
Coal, Lignate and Peat					
Petroleum products					
Natural gas					
Biomass and wastes					

Electricity
Heat
Total
Data as of 2024-12-31 from IAEA Referential Data Series 1

CHART 2: ENERGY CONSUMPTION

Final Energy consumption [PJ]

1.2. ELECTRICITY SYSTEM

1.2.1. Electricity System and Decision-Making Process

There are four authorities that are responsible for supplying power throughout the Emirates through the Emirates National Grid:

- Etihad Water and Electricity (ETIHAD WE)
- Department of Energy- Abu Dhabi
- Dubai Electricity and Water Authority
- Sharjah Electricity, Water and Gas Authority

The UAE national grid is an interconnected system that provides a strong capacity to withstand major or sudden disturbances, such as the loss of production units and failure of grid elements, whether due to outages or natural catastrophes, as well as several types of crises.

ETIHAD WE was established in 2020 under the Federal Decree-Law No. (31) of 2020 to carry out the duties assigned to the Federal Electricity & Water Authority at that time. It is wholly owned by the Emirates Investment Authority and is mandated to meet the needs of the Northern Emirates of electricity and desalinated water.

The DOE is responsible for developing strategic initiatives that diversify and secure energy sources for economic, environmental, and social sustainability for the Emirate of Abu Dhabi. The Abu Dhabi Development Holding Company (ADQ) is a wholly owned

entity of the Government of Abu Dhabi with a broad portfolio (energy and utilities, healthcare and pharma, mobility and logistics) of major enterprises, spanning key sectors of Abu Dhabi's diversified economy. ADQ owns in its energy portfolio—Abu Dhabi National Energy Company (TAQA), Emirates Water and Electricity Company (EWEC) and Emirates Nuclear Energy Corporation (ENEC).

TAQA owns fourteen operational power generation and water desalination plants across the Emirates. In addition, TAQA has three subsidiary companies that are responsible for providing transmission and distribution networks and grids—Abu Dhabi Transmission & Despatch Company PJSC (TRANSCO), Abu Dhabi Distribution Company (ADDC) and Al Ain Distribution Company (AADC). TRANSCO is responsible for the development, operations and maintenance of high-voltage power and bulk water transmission networks within Abu Dhabi and beyond. EWEC drives the planning and forecasting of the purchase and supply of water and electricity for the Emirate of Abu Dhabi and the four Northern Emirates (Umm Al Quwain, Fujairah, Ajman, and Ras Al Khaimah).

The Emirates Nuclear Energy Corporation (ENEC) is responsible for the Barakah NPP in particular, and its joint venture subsidiary company, the Nawah Energy Company (Nawah), a Private Joint Stock Company (PJSC), is responsible for operating and maintaining Units 1 to 4 of the Barakah Plant. Upon commercial operation of each unit, EWEC purchases all net dependable capacity as part of a Power Purchase Agreement (PAA) with ENEC's commercial and financial joint venture subsidiary, Barakah One Company.

DEWA and the Sharjah Electricity Water & Gas Authority (its ownership was transferred to the Sharjah Government as Sharjah Electricity and Water Authority (SEWA)) are independently responsible to establish, manage, operate and maintain electricity generation and water desalination plants and power and water transmission and distribution networks for the Emirate of Dubai and the Emirate of Sharjah respectively.

Abu Dhabi accounts for 52% of the federation's total capacity, followed by Dubai with 33%, while the Sharjah and Northern Emirates own 13% and 2%, respectively.

1.2.2. Structure of the Electric Power Sector

The grids of the four utilities in Abu Dhabi, Dubai, Sharjah and the Northern Emirates are connected through the Emirates National Grid (ENG), which amalgamates the generation, transmission and distribution networks of the seven Emirates into a single national grid. The ENG grid is also connected to the Gulf Cooperation Council Interconnector via the TRANSCO network.

1.2.3. Electricity Statistics

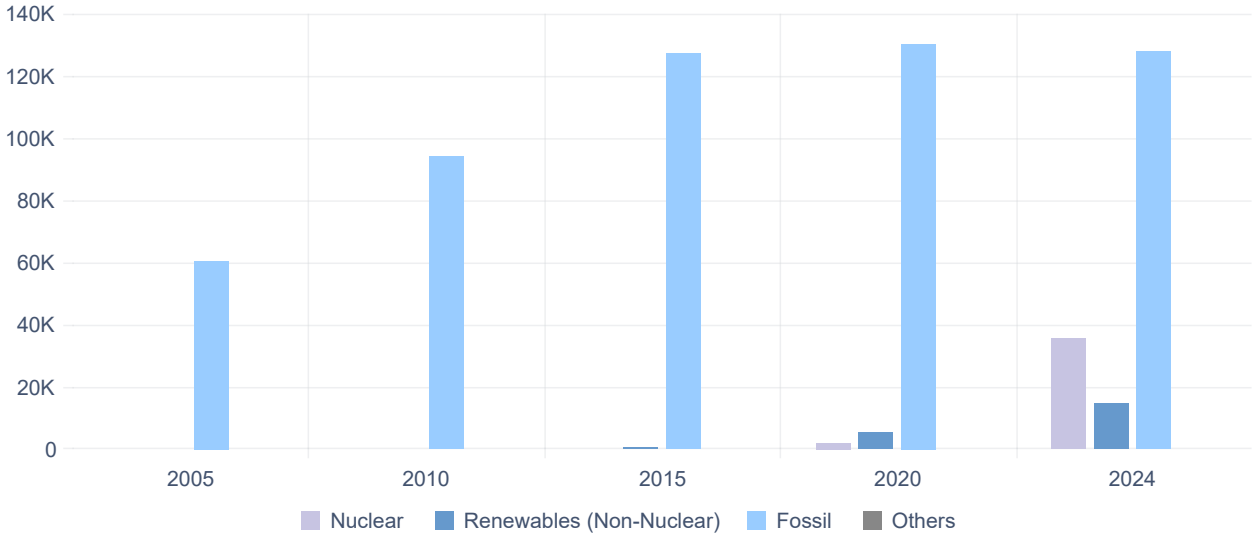
TABLE 3: ELECTRICITY PRODUCTION

Electricity production (GWh)					
Electricity production (GWh)	2005	2010	2015	2020	2024
Biomass and waste	0	0	0	3	44
Coal, lignite and peat	0	0	0	0	0
Natural gas	59491	92431	126495	129287	126843
Oil	1207	1518	597	754	867
Geothermal	0	0	0	0	0

Hydro	0	0	0	0	0
Nuclear	0	0	0	1791	35818
Solar	0	0	292	5475	14790
Tidal	0	0	0	0	0
Wind	0	0	0	0	0
Others	0	0	0	0	0
Total	60698	93949	127384	137310	178362
Biomass and waste					
Coal, lignite and peat					
Natural gas					
Oil					
Geothermal					
Hydro					
Nuclear					
Solar					
Tidal					
Wind					
Others					
Total					

Data as of 2024-12-31 from IAEA Referential Data Series 1

CHART 3: ELECTRICITY PRODUCTION



Electricity production (GWh)

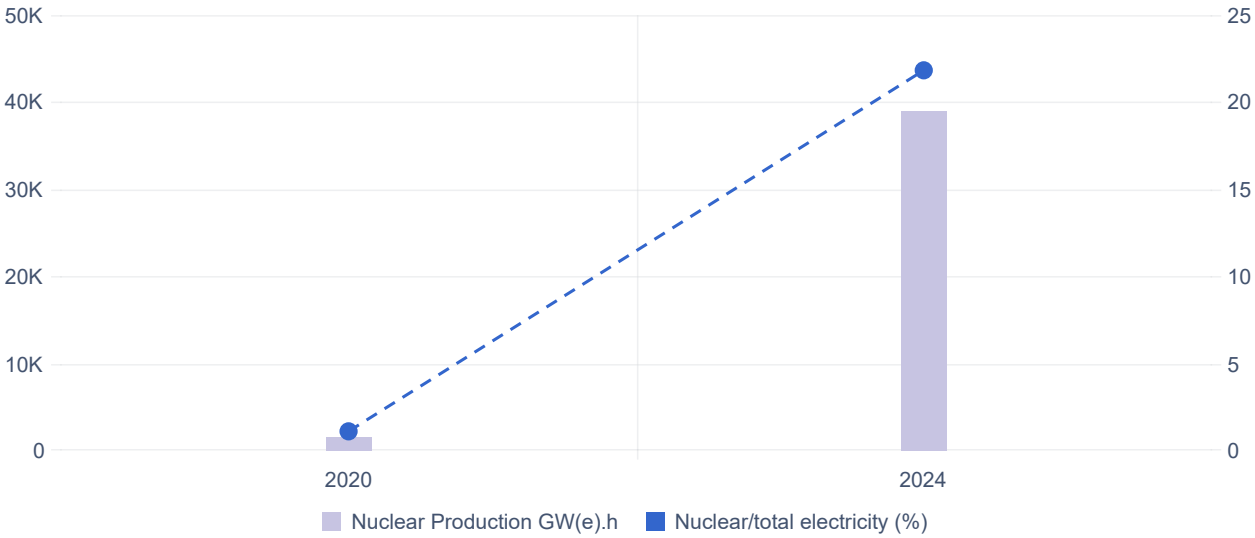
TABLE 4: NUCLEAR SHARE OF TOTAL ELECTRICITY PRODUCTION

	2005	2010	2015	2020	2024
Nuclear/total electricity (%)				1.1	21.8

Nuclear/total electricity (%)

Data as of 2024-12-31 from [IAEA Power Reactor Information System]

CHART 4: NUCLEAR SHARE TREND



1.3. NUCLEAR ENERGY SUPPORTING SDGs

UN Sustainable Development Goals	***How Nuclear Power Programme Supports Goals***
SDG7	*Nuclear energy creates affordable clean energy for all*
SDG 5	*The UAE nuclear program supports gender equality with one of the highest participations of female nuclear professionals globally, enabling access to high quality, high value careers for women*
SDG 9	*Nuclear energy provides reliable energy to power infrastructure*
SDG 13	*Nuclear energy has one of the lowest carbon footprints, generating clean baseload power*
SDG 16&17	*Nuclear energy is an international industry fostering collaboration and cross-border relationships to boost safety and safeguarding.*

2. NUCLEAR POWER SITUATION

2.1. OVERVIEW

The decision to develop a peaceful civilian nuclear energy programme was based on an in-depth evaluation of the UAE's future energy needs in 2007. The study determined that national annual peak demand for electricity was likely to rise to more than 40 000 MW by 2020. Even with these adjustments to account for the worldwide economic slowdown, the projected demand was beyond current capacity at that time.

The study determined that:

- Natural gas that could be made available to the nation's electricity sector would be insufficient to meet future demand.
- The burning of liquids (crude oil and/or diesel) would be logistically viable but costly and environmentally harmful.
- Coal-fired power generation, while potentially cheaper, would be environmentally unacceptable and potentially vulnerable from a security of supply standpoint.
- And finally, deployment of renewable and other alternative energy supplies, while desirable, would be able to supply only 6 to 7% of the required electricity generation capacity by 2020. This was later revised to around 4% per annum.

As previously highlighted, in developing its nuclear energy policy, the Government of the UAE made its peaceful objectives unambiguous. A policy document entitled "Policy of the United Arab Emirates on the Evaluation and Potential Development of Peaceful Nuclear Energy", released in April 2008, outlined a series of strategies and commitments:

- The UAE is committed to complete operational transparency.
- The UAE is committed to pursuing the highest standards of non-proliferation.
- The UAE is committed to the highest standards of safety and security.
- The UAE will work directly with the IAEA and conform to its standards in evaluating and potentially establishing a peaceful nuclear energy programme.
- The UAE hopes to develop any peaceful domestic nuclear energy capability in partnership with the governments and firms of responsible nations, as well as with the assistance of appropriate expert organizations.
- The UAE will approach any peaceful domestic nuclear energy programme in a manner that best ensures long-term sustainability.

These policies are enshrined in a number of mechanisms, including the Federal Law by Decree No 6 of 2009, Concerning the Peaceful Uses of Nuclear Energy. The UAE Nuclear Law takes into account all obligations and commitments that stem from international instruments and obligations. The UAE views the application of a Comprehensive Safeguards Agreement, bolstered by the IAEA Additional Protocol, as an important component of its model for the adoption of peaceful nuclear energy and as being consistent with its commitment to complete operational transparency and the highest standards of non-proliferation. The UAE signed a number of agreements for cooperation in the field of peaceful nuclear energy with numerous countries, including France, the Republic of Korea, the United Kingdom, and the United States of America. Other cooperation agreements have been concluded with Argentina, Australia, Canada, Japan and the Russian Federation.

2.1.2. Current Organizational structure

The key entities implementing the UAE Peaceful Nuclear Energy Programme include:

Entity	Responsibilities
Federal Authority for Nuclear Regulation (FANR)	The independent federal regulatory authority charged with the regulation and licensing of all nuclear-related activities in the UAE, with public safety as its primary objective.
Emirates Nuclear Energy Corporation (ENEC)	A company, wholly-owned by the Government of Abu Dhabi through ADQ, charged with developing, building, financing, operating, managing and owning nuclear reactors for the peaceful purpose of energy generation. A Joint Venture formed with KEPCO (as detailed below), the prime contractor for the Barakah NPP, resulted in the creation of two subsidiaries to manage the financing and operations of the Barakah NPP.
Korea Electric Power Corporation (KEPCO)	Korea Electric Power Corporation was appointed as a Prime Contractor during December 2009. During October 2016, ENEC established a joint venture partnership with KEPCO. ENEC and KEPCO also announced the establishment of Barakah One Company PJSC, an independent subsidiary owned by both companies, which represents the commercial and financial interests of the Barakah project. As part of the Joint Venture Agreement, Nawah Energy Company (Nawah) was formed to operate and maintain the Barakah NPP. Under the joint venture, KEPCO has an 18% stake in Barakah One Company, with ENEC as the majority owner of the remaining 82%. Under the agreement, KEPCO has an 18% stake in Nawah and ENEC remains the majority owner, with 82% ownership of the company.
Nawah Energy Company (Nawah)	Nawah was established during May 2016 as the subsidiary mandated to operate and maintain Barakah Units 1 to 4. Nawah holds the operating licenses for Units 1, 2, 3 and 4 of the Barakah NPP. The Barakah NPP will generate 40 TWh of clean electricity, making up about 25% of the UAE’s electricity demand when all four units are fully operational.
Barakah One Company	Barakah One Company was established in 2016 as the entity mandated to manage the commercial interests of the Barakah project, secure project finance from institutional and commercial lenders and receive funds for the electricity generated from Units 1 to 4 of the Barakah NPP. Barakah One Company holds the Power Generation License from the DoE.

2.1.3. Development Strategy

On 27 December 2009, the Emirates Nuclear Energy Corporation announced that it had selected a team led by Korea Electric Power Corporation to design, build and help operate civil nuclear energy plants for the UAE Peaceful Nuclear Energy Programme. Currently, the development of the Barakah NPP is complete. Construction of Unit 1 commenced in 2012. Once all four units are operational, they will deliver up to a quarter of the UAE’s electricity needs from carbon-free nuclear energy.

During May 2017, ENEC and KEPCO completed the handover of Unit 1 systems for commissioning, marking the end of the initial construction activities for the first of four units of the Barakah project. Nawah received the Operating License for Unit 1 from the Federal Authority for Nuclear Regulation during February 2020 and fuel load was successfully completed during March 2020. Unit 1 start-up was announced on 1 August 2020, and the grid connection on 19 August 2020, with commercial operation announced on 6 April 2021. Unit 2 received the Operating License on 9 March 2021, and the fuel load was completed on 23 March 2021. Unit 2 was started up on 27 August 2021 and connected to the grid on 14 September 2021. It began commercial operation on 24 March 2022.

Construction of Unit 3 was completed on 4 November 2021 and the Operating License of Unit 3 was received in June 2022, followed by initial fuel load in the same month. The unit achieved initial criticality during September 2022 and was connected to the grid for the first time during October 2022. It entered commercial operations during February 2023. Unit 4 received the Operating License on 17 November 2023 and fuel load was completed on 19 December 2023. Unit 4 was connected to the grid during March 2024 and now is in the final stages of Power Ascension Testing prior to the start of commercial operations.

ENEC's four identical reactors are based on KEPCO's APR1400, a Generation III+1400-MW nuclear energy reactor with evolutionary improvements in safety, performance and environmental impact. A certificate for the standard design approval was issued for the APR1400 by the Korean regulatory authority, the Korean Institute of Nuclear Safety (KINS), in 2002. The U.S. Nuclear Regulatory Commission (NRC) of the United States of America issued the design certification for the APR1400 in 2019. In 2017, KEPCO obtained the European Utility Requirements (EUR) Certificate for the EU-APR, a modified version of the APR1400 reactor.

The first of the APR1400 units are Shin-Kori Unit 3 (operational in December 2016) and Unit 4 (operational in August 2019) (renamed to Saeul Units 1 and 2) in the Republic of Korea, having obtained a Construction Permit KINS. The first UAE NPP is the fifth unit of the APR1400 reactor fleet in the world, and the Shin-Kori plants serve as the "reference plants" for the UAE programme. As a Generation III+ reactor, the APR1400 has been designed to meet heightened safety goals developed in accordance with the latest international safety standards. The APR1400 design incorporates more than 30 years of operational learning and features enhancements in safety, reliability and efficiency.

The UAE's policy surrounding front-end and back-end nuclear fuel cycle complies with the guidelines established by the IAEA. Given the growth in electricity demand projected for the United Arab Emirates, it is possible that additional units beyond the original four will be procured in the future as the UAE expands its fleet of civil NPPs. The ground infrastructure for a further four units was implemented at the same time as the infrastructure was built for Units 1-4 should the Government of the UAE give a direction to increase the number of units.

2.2. CONSTRUCTION

2.2.1. Project Management

Not Applicable

2.2.2. Project Funding

The Barakah project was financed through a combination of equity commitments and loan facilities from various sources. The financing was provided by the UAE and Korea Import Export bank with loan guarantees and a power purchase agreement (PPA) in place. The total estimated project financing, as announced in 2016, of the NPP construction is USD 24.5 billion. Since then the plant has been refinanced, with the latest project load being identified as having green loan status. The first nuclear plant in the Middle East and Asia regions to achieve this.

2.3. OPERATION

2.3.1. Status and Performance of Nuclear Power Plants

TABLE 5B: STATUS OF REACTORS IN OPERATION

Reactor Unit	Type	Net Capacity [MW(e)]	Status	Operator	Supplier	First Grid Date	Commercial Date	Suspension Date
BARAKAH-1	PWR	1337	Operational	NAWAH	KEPCO	2020-08-19	2021-04-01	
BARAKAH-2	PWR	1337	Operational	NAWAH	KEPCO	2021-09-14	2022-03-24	
BARAKAH-3	PWR	1337	Operational	NAWAH	KEPCO	2022-10-08	2023-02-24	
BARAKAH-4	PWR	1337	Operational	NAWAH	KEPCO	2024-03-23	2024-09-05	
Number of reactors: 4								

Data as of 2024-12-31 from IAEA Power Reactor Information System

2.3.2. Plant Life Management, Plant Upgrades and License Renewals

The UAE was entering the third year of its development of a nuclear energy programme when the accident at the Fukushima Daiichi NPP occurred in 2011; in response, the country's own nuclear entities took swift action to implement additional measures as a result of the lessons that initially arose from the accident. These early lessons learned were incorporated into the UAE's Construction License Application (CLA) for Units 1 and 2, which had been submitted in December 2010. To ensure that the units would be constructed under the most robust safety framework, a team of over 200 FANR staff members and three international consulting firms reviewed the license application, taking into consideration the changes that resulted from the accident at the Fukushima Daiichi NPP.

As a supplement to the CLA, ENEC conducted a comprehensive safety assessment (requested by FANR) entitled "Safety Assessment Report for Barakah Nuclear Power Plants (Lessons Learned) from the Fukushima Accident", which was submitted to FANR in December 2011. Resulting from its assessment, ENEC identified specific features that could be modified in order to increase the robustness of the UAE's Barakah site and overall programme. The UAE was focused on preventing or otherwise being able to effectively handle possible consequences of hazardous natural consequences, and thus targeted the robustness of the units, particularly mitigating station blackout and loss of ultimate heat sink events. Particular measures that were pinpointed in this regard include:

- Provision of a diverse protection system to initiate scram and auxiliary feedwater;
- Diverse, accurate and redundant instrumentation;
- Design of shutdown cooling taking into account two independent and redundant suction lines and interchangeability of the containment spray pumps;
- Steam generator nozzle dam integrity;
- Alternative methods for water addition and decay heat removal;
- Alternate AC diesel generator;
- Two turbine-driven auxiliary feed-water pumps;
- Physical separation of redundant systems and components required for safe reactor shutdown and decay heat removal;
- Provision of fire protection features such as fire detection, automatic and manual fire suppression and fixed fire barriers.

2.3.3. Organizations and Institutions

The first unit of Barakah NPP is currently in operation in the UAE after receiving the Unit 1 Operating License from FANR on 16 February 2020.

In 2016, ENEC established Nawah Energy Company as its operating subsidiary, mandated to operate and maintain the UAE's four Barakah units. To support Nawah, ENEC and Korea Hydro and Nuclear Power (KHNP) signed an Operating Support Services Agreement (OSSA) in July 2016, under which KHNP provides experienced and qualified nuclear plant personnel to the Barakah NPP.

As part of the OSSA, the Korean company has dedicated over 300 experienced nuclear operators and engineers to the Barakah NPP until 2030. This will ensure that ENEC and Nawah have the support of KHNP for the first 10 years of operation of the four units at the Barakah NPP. ENEC and Nawah are focused on encouraging and training Emirati personnel in the nuclear field in order to preserve top local knowledge and expertise in the nuclear sector.

In 2019, Nawah signed a Long-Term Maintenance Services Agreement (LTMSA) with KHNP, supported by KEPCO Plant Service & Engineering (KPS). Under the scope of the signed LTMSA contract, KHNP and KPS provides maintenance services to support routine and outrage maintenance activities of the four APR1400 units of the Barakah NPP, under the leadership of Nawah and in strict accordance with the UAE's nuclear energy regulator's quality and safety standards.

During the same year, Nawah signed a Maintenance Service Agreement (MSA) with Doosan Heavy Industries & Construction (DHIC), a subsidiary of the Doosan Group, for the Barakah NPP. Under the agreement, DHIC provides Nawah with a range of maintenance services and qualified personnel to support routine and outage maintenance activities across the four 1400 MW APR1400 Units at the Barakah NPP.

2.4. DECOMMISSIONING

The operational plan for each of the four units is to be in operation for 60 years. The corresponding shut down dates of individual units are thus scheduled to be in 2081, 2082, 2083 and 2084 respectively, unless an extension of the operating licenses for each unit are received.

In terms of the legislative environment, UAE has established a comprehensive and forward-looking framework to address the back-end of the nuclear energy program. This framework ensures the safe, secure, and responsible management of spent nuclear fuel and radioactive waste, as well as decommissioning of nuclear facilities and long-term institutional oversight. The UAE's approach builds on international obligations and proven strategies, incorporating universally adopted key principles and objectives.

The Federal Law Decree No. 6 of 2009 concerning the Peaceful Uses of Nuclear Energy Articles 40-41 address radioactive waste management and decommissioning of nuclear facilities licensees are responsible for the safe management and storage of radioactive waste until it is delivered RWMO for disposal.

Nuclear back-end Financing

The Nuclear Law (Art. 42) mandates establishment of a Decommissioning Trust Fund. The Decommissioning Trust Fund will cover the decommissioning of nuclear facilities costs and other costs associated with nuclear back-end (i.e. of Spent Nuclear Fuel and Radioactive Waste Management and Disposal), as well as of regulatory oversight. ENEC Operations periodically deposits due

annual contributions to the Decommissioning Trust Fund since start of its first unit in 2021, with FANR conducting diligent oversight of paid contributions.

Barakah NPP Decommissioning Plan

The Nuclear Law and applicable FANR regulation FANR-REG-21 define that the owner of the operating license must prepare the Initial Decommissioning Plan of the facility periodically over the lifetime of the facility. The owner of the decommissioning license will have to implement the regulatory approved Final Decommissioning Plan. All decommissioning activities will be financed by the Decommissioning Trust Fund and the Radioactive Waste and Spent Nuclear Fuel will be transferred to the ownership and repositories of the national Radioactive Waste Management Organization.

Barakah NPP has submitted its first Initial Decommissioning Plan to FANR in 2017 and periodically updates its Initial Decommissioning Plan every three years since. For Barakah NPP decommissioning, an Immediate Dismantling strategy has been selected. The end of decommissioning works is scheduled to be reached for Units 1-4 in 2101, 2102, 2103 and 2104.

The Barakah NPP Decommissioning Strategy assumes that the end-state of the facility will be one where any residual radioactivity of operations has been reduced to acceptable levels in order for the License Conditions to be removed by the regulator.

The cost calculation conservatively assumes that during Decommissioning stage, all buildings, and structures (Reactor Containment Buildings, Turbine Generator Buildings, Compound Buildings, Auxiliary Buildings, other buildings and structures related to the Barakah NPP) will be demolished, followed by site restoration activities. After a final survey of the Barakah NPP Site, it will be released for unrestricted use.

The cost estimates of Barakah NPP decommissioning are prepared under the International Structure for Decommissioning Costing methodology (OECD-NEA No. 7624) and are calculated to be USD 6.8 billion (2022), including management and disposal of the decommissioning radioactive waste.

2.5. PLANNED DEPLOYMENT OF NUCLEAR POWER

As of 31 December 2024, the United Arab Emirates currently has no plans to deploy additional nuclear power reactors.

2.6. FUEL CYCLE AND WASTE MANAGEMENT

2.6.1. Fuel Cycle Activities

With regard to nuclear fuel procurement, a portfolio of leading international nuclear fuel suppliers has been contracted to provide a series of nuclear fuel services to cover ENEC’s requirements. The resulting fuel supply strategy guarantees security of supply, quality assurance of fuel-related materials and competitive commercial terms to protect the interests of the UAE Peaceful Nuclear Energy Programme by providing volume flexibilities and the ability to adapt to changing market conditions.

The following services have been contracted by ENEC:

- Purchase of natural uranium concentrates;
- Conversion services (in which uranium concentrates are converted to material ready for enrichment);
- Enrichment services (in which the converted material is enriched to a level that is used in the fuel for NPPs);

- Purchase of enriched uranium product.

The enriched uranium is supplied to KEPCO Nuclear Fuels (KNF), which manufactures the fuel assemblies for use in the four Barakah units.

A total of six leading companies in the nuclear fuel supply industry participate in the ENEC fuel supply programme: ConverDyn (United States of America) provides conversion services; Uranium One, Inc. (Canada) provides natural uranium; URENCO (headquartered in the United Kingdom) provides enrichment services; and Rio Tinto (headquartered in the United Kingdom) provides natural uranium. In addition, TENEX (Russian Federation) supplies uranium concentrates, conversion services and enrichment services, while AREVA (France) provides uranium concentrates, conversion services and enrichment services.

The UAE is developing and implementing a strategy for the management of all nuclear fuel cycle activities, including the procurement, use, and short- and long-term management of nuclear fuel for its NPPs. The strategy conforms to guidelines established by the IAEA and will be continuously updated, taking into account new information and technological advances from the nuclear industry during the next decades, before the long-term spent fuel management plan is implemented.

2.6.2. Waste Management

Emirates Nuclear Energy Company (ENEC) and its affiliates are responsible for the safe management and storage of radioactive waste and spent fuel generated from Barakah NPP until its delivery to the future waste management organization or future operator of a waste disposal facility.

ENEC has established a seeding function for the Radioactive Waste Management Organisation (RWMO) within the ENEC to ensure the proper management of planned waste streams at Barakah NPP.

Radioactive waste generated at Barakah NPP is subject to ‘FANR Regulation on the Radiation Protection and Pre-disposal Management of Radioactive Waste Management in Nuclear Facilities’ (FANR-REG-11). Processes and procedures are in place at the plant for the management of radioactive waste. These support the effective operation of the reactor units and make use of proven technology to minimize waste generation, as well as to safely segregate, characterize, treat and condition waste for storage and future disposal.

Radioactive waste produced during the operations of Barakah NPP are safely stored in a dedicated on-site interim radioactive waste storage building.

The spent fuel generated by reactor units of Barakah NPP are temporarily emplaced in spent fuel storage pools of each reactor unit. The design of Barakah NPP provides sufficient capacity in the spent fuel storage pool for 20 years of operation for each reactor unit.

The spent fuel will then be transferred into an Independent Spent Fuel Storage Installation (ISFSI), to be established before the spent fuel storage pools reach their maximal capacity. A preliminary storage feasibility study has been conducted to identify the ideal location within the current site boundary for a future storage facility.

The UAE Radioactive Waste and Spent Nuclear Fuel Management Draft Policy of 2021 sets out the objectives regarding the management of radioactive waste and spent nuclear fuel following a graded approach based on the IAEA classification scheme.

The Draft Policy specifies the direct disposal of Spent Nuclear Fuel in a Deep Geological Repository as the reference option. In line with the policy, Low Level Waste will be ultimately disposed of in an engineered. Near Surface Disposal Facility. Intermediate Level Waste will be routed to the Deep Geological Repository.

ENEC has initiated the development of a Near Surface Disposal Facility. This future facility will represent a safe and sustainable endpoint of LLW produced in the UAE, in line with 'FANR Regulation on Disposal of Spent Fuel and Radioactive Waste' (FANR-REG-27).

As part of the UAE's nuclear energy policy, the country made the decision to forgo domestic enrichment and reprocessing of nuclear fuel; these are two key elements of the country's commitment to non-proliferation.

2.7. EMERGENCY PREPAREDNESS

The Federal Law by Decree No (6) of 2009 Concerning the Peaceful Uses of Nuclear Energy (i.e. the UAE Nuclear Law) establishes the Federal Authority for Nuclear Regulation (FANR) as the regulator of the nuclear sector in the United Arab Emirates (UAE). This law specifies the roles and responsibilities of FANR in relation to emergency preparedness and response including the development, review, approval and oversight of the on-site and the off-site emergency plans; the licensee; and the competent authorities.

The Federal Law No (23) of 2006 Concerning Civil Defence in the UAE specifies the roles and responsibilities of the UAE Civil Defence to ensure the protection of personnel, property and national resources both during times of stability and instability.

The Federal Law by Decree No (2) of 2011 establishes the National Emergency, Crisis and Disasters Management Authority (NCEMA) as the national competent authority for developing national emergency preparedness, the response and recovery framework, standards and national plans, coordinating response, supporting capacity-building and the capacities of different entities, and conducting exercises. This law outlines the main functions and responsibilities assigned to NCEMA on the management and coordination of emergencies, crises, and disasters.

The UAE's emergency management system is documented in the National Response Framework with NCEMA as the lead. This framework describes the functions of all response organizations for emergencies, crisis, and disasters in the UAE. It provides a framework to coordinate efforts at the national level and to adopt a strategy at both local and federal government levels.

For nuclear and radiological emergencies, NCEMA has developed the General Framework for Nuclear and Radiological Emergency Response in cooperation and coordination with FANR and other concerned entities. This framework describes the emergency management system for such emergencies. It also describes the planning basis for radiological or nuclear events, identifies the roles and responsibilities of each concerned entity, describes in general the notification process, activation, concept of operation, planning zones, operations management, termination and recovery, and defines a classification scheme for nuclear and radiological emergencies.

FANR and NCEMA completed a memorandum of understanding (MOU) on 15 July 2012 on Cooperation in the Field of Nuclear and Radiological Emergency Preparedness and Response. This MOU outlines the responsibilities of both FANR and NCEMA for emergency plans and programmes. There are regular meetings of the steering committee to oversee cooperation under the MOU.

FANR is part of two committees in relation to the Barakah NPP: The National Emergency Preparedness Coordination Committee and the Barakah Exercise Preparation Committee, which were established by NCEMA.

NCEMA and other concerned entities contributed to the National Risk Register, which provides an analysis and assessment of potential risks and threats the country faces including all internal and external radiological and nuclear risks and hazards. NCEMA manages and maintains the National Risk Register.

During February 2019 NCEMA developed the National Recovery Framework. This framework describes the recovery functions of all organizations in the UAE. It allows efforts to be coordinated at a national level so that a strategy can be adopted at a local, federal, and national level in order to stabilize the situation after an emergency, crisis or disaster.

In 2021 the Ministry of Interior, in cooperation with the concerned entities, issued the fifth version of the Off-site Nuclear and Radiological Emergency Response Plan for the Barakah Nuclear Power Plant (hereafter referred to as the Off-site Plan), which describes and details the concept of operations and specific roles and responsibilities of each national response entity, and the support organizations.

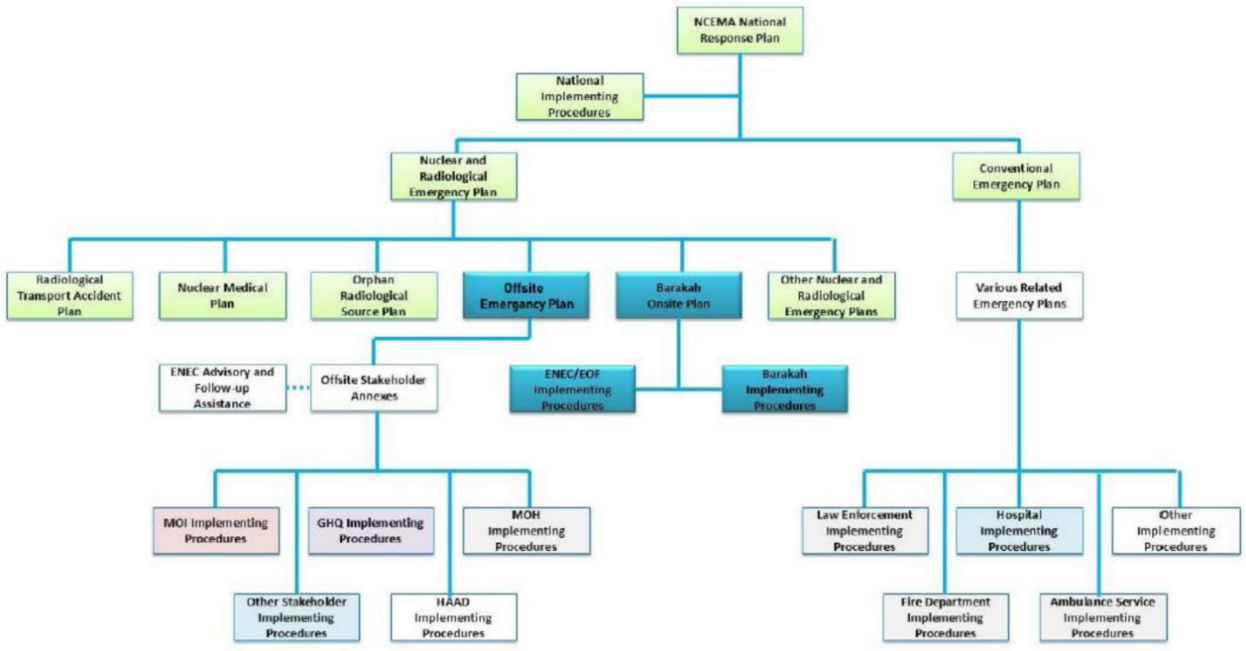


FIG. 1. Emergency Preparedness Program Hierarchy

On-site emergency planning

The FANR Regulation for Emergency Preparedness and Response for Nuclear Facilities (FANR-REG-12) specifies the FANR's requirements for the licensee's preparation and response to an emergency at a nuclear facility. Its purpose is to ensure that the licensee has an organization that is capable of coping with emergencies and mitigating their consequences, and that the licensee can carry out assessment actions and implement notification procedures. It also requires the licensee to demonstrate that it has

adequate emergency facilities and equipment, provides appropriate training, maintains emergency preparedness, and is capable of recovery after an emergency. The licensee's arrangements must be described in the emergency plan including the authorities, responsibilities and duties of individuals assigned to it, and the means for notification of such individuals in the event of an emergency. This regulation was revised based on the lessons learned from its implementation, IAEA newest standards and best practices around the world. The revision also considered the feedback from all applicable stakeholders. The new version was published in 2021.

FANR issued regulatory guide FANR-RG-035 entitled Regulatory Guide for Emergency Preparedness for Nuclear Facilities, which provides methods and/or criteria acceptable to the Authority for meeting FANR requirements for the licensee's preparation, planning and response to an emergency at a nuclear facility.

Off-site emergency planning

FANR Regulation on the Requirements for Off-site Emergency Plans for Nuclear Facilities (FANR-REG-15) provides the requirements for the off-site emergency plan. This regulation defines the responsibilities and duties for implementation, measures for mitigation and remediation of consequences, arrangements for warning of the public, and measures for testing emergency preparedness.

The Ministry of Interior in coordination with the concerned entities have developed the off-site plan in accordance with FANR-REG-15. The off-site plan includes annexes addressing roles and responsibilities of external stakeholders; each supported by implementing procedures.

The main stakeholders that form part of the off-site response organization include the following:

- National Emergency Crisis and Disasters Management Authority (NCEMA)
- Ministry of Interior (MOI)
- National Guard
- Ministry of Defence (MoD)
- Federal Authority of Nuclear Regulations (FANR)
- Emirates Nuclear Energy Corporation (ENEC)

Twenty-eight (28) other stakeholders provide support to the off-site plan.

2.8. RESEARCH AND DEVELOPMENT

The ENEC Nuclear Research & Development (R&D) Department was established to support the long-term sustainability of the Barakah Nuclear Program, explore opportunities for advanced technologies to drive ENEC's growth, and foster human capacity development. The department develops R&D projects through strategic national and international partnerships, predominantly basic, long-term research. Research areas in focus include new technologies, including advanced reactors, SMRs and microreactors, plant reliability and efficiency, safety, sustainability, radiation protection, as well as the management of spent fuel and radioactive waste.

2.8.1. Development of Novel Technology and Applications

ENEC launched the ADVANCE Program in 2023 to explore SMRs, advanced reactors, and microreactors as part of the UAE's clean energy strategy. ENEC is partnering with national stakeholders and global technology providers to assess deployment pathways and investment opportunities, and has a number of MoUs in place with key technology providers globally.

https://www.enec.gov.ae/news/latest-news/enec-launches-advance-program-to-accelerate-decarbonization-through-advanced-nuclear-technologies/

2.8.2. Organizations and Institutions

The Government of the UAE has supported the establish of a nuclear R&D programme, especially through expanding partnerships with existing supplier nations. Central to the UAE's approach to developing a nuclear energy programme has been the importance of building a qualified workforce for the short- and long- term. ENEC joined Abu Dhabi's Khalifa University, the Institute of Applied Technology, FANR and other institutions across the UAE education system, as well as with universities internationally, in order to ensure that there will be a reservoir of talent, both Emirati and expatriate, well into the future.

DuringJanuary 2020, Emirates Nuclear Technology Center (ENTC) was formed as a collaboration between Emirates Nuclear Energy Corporation, the Federal Authority for Nuclear Regulation, Khalifa University (KU) and external joint venture stakeholders. The main objectives and goals of ENTC are to:

1. Maintain and enhance the national nuclear and radiological technology programmes.
2. Continue to conduct technical analysis of the nuclear technology sector to meet stakeholders developing needs.
3. Develop nuclear technology capabilities in the UAE in order to become an internationally recognized innovator.
4. Research of new nuclear technology approaches and applications which can be incorporated into the national R&D and innovation system.

The Federal Law by Decree No. 6 of 2009, Concerning the Peaceful Uses of Nuclear Energy, empowers FANR to carry out and support research and development studies relevant to its scope of work and to initiate and coordinate safety related R&D work with other authorities. As a result of these provisions, FANR collaborated with institutions of responsible nations aimed at developing R&D capabilities within its nuclear energy programme, as well as to use the operating experience of other countries on major safety issues. As of 2020, FANR is engaged in 13 research collaboration agreements with countries (such as Belgium, France, Norway and the United States of America) and international organizations (such as the Nuclear Energy Agency of the Organisation for Economic Co-operation and Development, the IAEA and the International Commission on Radiological Protection). Research and development is an essential building block for a sound regulatory system as it provides world-wide access to tools, data and expertise necessary for rigorous decision-making to ensure regulations have safety focus.

Many countries with small civil programmes established regulatory programmes and benefitted from bilateral and multilateral cooperation to meet their needs. While it is industry's responsibility to conduct the R&D necessary to establish the safety case for an activity, regulatory bodies conduct research to provide a sound scientific basis for regulations and regulatory decisions. Moreover, ENEC is now concluding the development of its R&D strategy to identify opportunities to utilize knowledge and expertise in related sectors.

2.9. HUMAN RESOURCES DEVELOPMENT

The UAE has taken an incremental approach to building the capabilities needed to successfully execute a nuclear energy programme based on a mix of advisors, support companies and indigenous staff. Initially, a relatively small group of advisors were engaged to assist in the early planning and development of the human resources development (HRD) programme. Particularly with the establishment of the UAE nuclear regulator (FANR) and the owner/operator (ENEC and subsidiary Nawah), the Government saw the need for enhanced capacity building and human resource development, and thus dedicated funds were allocated and planned for in the early stages of the NPP programme.

Due to the UAE's small native population, international experts were brought on board to ensure that the project would develop and maintain a professional nuclear cadre. At the national level, a base of technical expertise was brought in from other sectors as fundamental support for the programme. In addition, extensive efforts were put into launching educational programmes to qualify a large set of young engineers and nuclear-related experts. Following this strategy, FANR, ENEC, and Khalifa University began implementing various steps in order to meet the needs related to their human resource development plans.

The FANR Knowledge Management Programme began in 2011, with the ambition of becoming one of the Nuclear Knowledge Management modules to be followed. The objective of the programme is thus to pool the collective knowledge and experience of FANR in a manner for employees to constantly learn, have a sense of belonging and contribute to the overall mission of FANR, while maintaining the highest standards of nuclear safety, radiation safety, nuclear security, safeguards and human capacity. FANR also identified the following objectives for the Knowledge Management Programme:

- Minimize the risk of knowledge loss due to employee mobility.
- Develop harmonized approaches for building the experience that will lead to better nuclear regulations for safe and secure operations.
- Increase effectiveness and efficiency through availability of knowledge that enhances quality of collaboration and minimizes the impact of rework and repeatable errors.
- Assure sustainability of the UAE nuclear programme through effective nuclear knowledge transfer from one generation to another.

FANR has become a multi-cultural organization which collectively has more than 27 different nationalities distributed across the various departments. Each individual in the organization possesses knowledge that is integral to day-to-day work. As an organization, FANR requests consultant organizations to provide consultations to assist in the implementation of projects and programmes or to implement them on the basis of the skills and expertise that they can offer.

FANR is adopting an HR strategy that has two tracks: 1) staffing the organization with senior expatriates to deal with short-medium term needs and 2) development and capacity building to ensure long-term sustainability. Currently FANR has a strong Emirati cadre of senior and professionals in nuclear safety and radiation protection. As of April 2023, FANR employs around 250 employees of which Emirati constitute 72%, and women make up 45% of the total workforce.

A Developed Programme, launched in 2016, is in place and helps Emirati engineers and physics and law graduates acquire the fundamental knowledge necessary to understand technical aspects of nuclear engineering, nuclear regulation and radiation protection. FANR also adopts other career development tools including on-job-training with other nuclear regulators in other countries, in-house training, and knowledge management programmes which consist of multiple tools, including the Library and Learning Center, expert debriefing interviews, the Knowledge Management Department Representatives Group, and the integration of knowledge management methodologies and activities in FANR processes and procedures. Moreover, FANR is working on strengthening the competency of human capital in the organization by implementing a competency development framework which

is considered as the foundation for continuously ensuring a highly competent workforce at FANR. In 2020, technical and behavioral competency assessments for both divisions were completed in an effort to highlight focused training and development needs.

ENEC has selected a nuclear-experienced managing agent to support its development and solicitation of bids for the nuclear energy programme. Key positions within the organization were filled with experienced nuclear contractors, while other key positions have been supported by nuclear experts. In addition, ENEC was able to tap into the experienced professionals from the UAE's long-established oil and gas, energy and mega-project industries to build its management ranks. Focusing on national capacity building, ENEC maintained an Emiratization rate of around 60% for its employees. The UAE recognizes the importance of developing indigenous capabilities for the long-term success of its nuclear energy programme. To foster a local nuclear cadre, the UAE has established a nuclear scholarships programme, which will produce engineers to support the staff of the nuclear plant, regulatory staff and educational infrastructure. To date, over 500 students graduated from an ENEC-sponsored programme. The UAE has also cooperated with the IAEA in developing its human resource capacity. Since 2010, projects focusing on this area have constituted one of the largest parts of the UAE Technical Cooperation programme with the IAEA, both in terms of funding and number of activities.

In keeping with this effort, an extensive relationship between ENEC and the Khalifa University of Science, Technology and Research (KU) in the UAE has been established. KU supports a bachelor's degree programme in mechanical engineering and a master's degree programme in nuclear engineering. Recognizing the near-term need for qualified engineers, relationships with universities with strong nuclear engineering programmes located in the Republic of Korea and the United States of America have also been established to support UAE nuclear scholarships. During June 2014, the UAE's first group of local operators graduated after successfully completing specialized training programmes in the UAE and the Republic of Korea, designed to equip the operators with the expertise necessary to oversee safe operations at the UAE's first nuclear plant.

In addition, Khalifa University hosted the Nuclear Energy Management (NEM) School, which provides training courses delivered by the IAEA and organized in cooperation with FANR, for students and young professionals from the Asia and Pacific region. Offered in 2012, 2015, 2017 and 2019, the courses provided relevant knowledge to ensure a solid nuclear expert foundation, through building leadership skills to manage nuclear energy programmes. Khalifa University, which is an IAEA Collaborating Centre since 2018, provides support to activities on nuclear infrastructure development in newcomer countries. KU have partnered with Texas A&M University to develop and operate the Gulf Nuclear Energy Infrastructure Institute (GNEII) at Khalifa University campus in Abu Dhabi, UAE. GNEII provides an institutional capability for nuclear energy infrastructure development emphasizing education in nuclear energy safety, safeguards and security. GNEII's goal is to be an indigenous, self-supporting regional education centre for future nuclear energy professionals working in government and industry. GNEII gives opportunity for graduating fellows who work at ENEC, FANR and other industry-related organizations to share their research results and network with experts from around the world.

With a further Emirati focus in this area, FANR also participates in the IAEA Steering Committee on Competence of Human Resources for Regulatory Bodies. The UAE has also welcomed and participated in high-level open discussions on the HRD issue, through the hosting of the first of its kind international conference on HRD in 2010 in Abu Dhabi and later sharing its experience at the follow-up international conference on HRD in 2014.

In 2019, the UAE reached a major milestone with the certification and licensing of its first senior reactor operators (SROs), reactor operators (ROs) and local operators (LOs). These individuals have completed a comprehensive training programme, which lasted for three-years and was developed by ENEC and Nawah, according to the regulations set out by FANR. The training programme combines hands-on experience from some of the industry's leading engineering and nuclear energy experts with a discipline-

focused curriculum, to ensure the students enter the UAE's nuclear energy industry with world-class training. The first group of SROs and ROs had the opportunity to train in the Republic of Korea, South Africa, the United Arab Emirates and the United States of America. As of 2024, the total number of certified SROs and ROs is 193, of which 69 are UAE nationals, and 9 are women. These first operators will soon be joined by many more qualified individuals to provide a sustainable pipeline of talent for the decades of operations ahead.

2.10. STAKEHOLDER INVOLVEMENT

ENEC manages its stakeholders by conducting awareness initiatives across multiple social levels, including the general public, local government bodies, and educational institutions. ENEC developed a comprehensive series of physical sessions to ensure that a wide range of stakeholders are informed about the program's objectives and benefits. Public support for nuclear energy continues to grow, with favourability for using nuclear energy to generate electricity rising to 85% in 2023, up from 81% in 2022. Similarly, overall acceptance of nuclear energy reached 84% in 2023, compared to 83% in 2022 and 77% in 2021, reflecting a steady upward trend in positive perception.

The success of the Outreach Program is evaluated through a combination of qualitative and quantitative metrics, such as:

- Stakeholder Engagement: Monitoring participation rates and gathering feedback from stakeholders during workshops, forums, and other outreach events.
- Satisfaction Surveys: Measuring the effectiveness of the information delivered in the sessions by collecting participant feedback.

In 2024 alone, over 75 outreach sessions were successfully conducted, engaging more than 3000 students and stakeholders. The program achieved an impressive overall satisfaction rate of 93%, underscoring the impact and effectiveness of these engagement efforts.

Stakeholder Satisfaction Survey

As part of our ENEC Strategy to build and keep strong relationships with external stakeholders, we conduct annual survey to evaluate the stakeholders experiences and satisfaction with our organization. This survey provides critical insights into stakeholder perceptions and helps identify key areas for improvement. Our objective is to leverage this feedback to continuously enhance the quality of engagement and ensure a positive stakeholder experience.

The overall external stakeholder satisfaction rate has remained consistently strong, maintaining an 88% rating from 2023 to 2024.

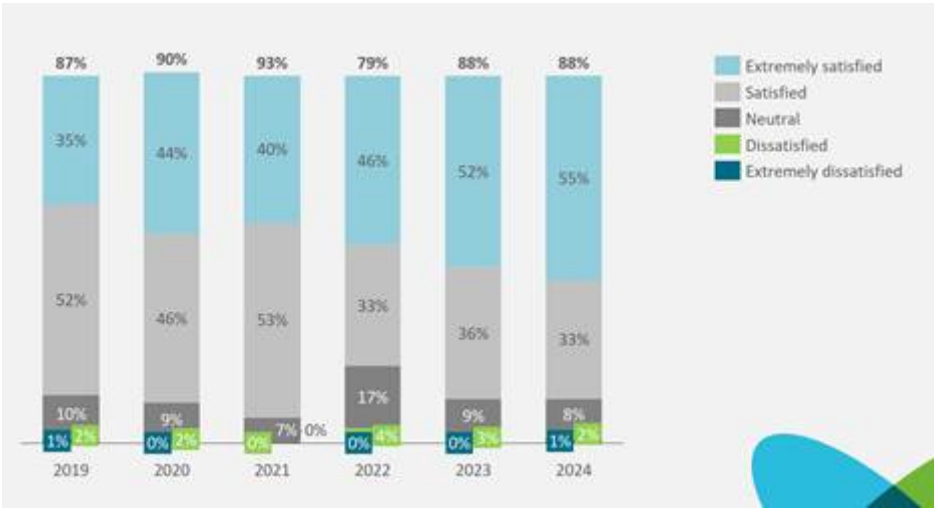


FIG. 2. Stakeholder Satisfaction Survey Results

In addition to these efforts, we implement targeted awareness initiatives aimed at building trust, enhancing understanding, and ensuring stakeholders and communities are well informed. Public awareness of nuclear energy has shown steady growth, and we remain vigilant in monitoring and responding to both local and national perspectives on our planned projects. Moreover, we actively collaborate with national partners to exchange best practices and align efforts on cooperative initiatives that promote the safe, responsible, and sustainable advancement of energy solutions.

2.11. INTERNATIONAL COOPERATIONS AND INITIATIVES

As a member of the IAEA since 1976, the UAE has committed itself to various IAEA strategies on operational transparency, non-proliferation and nuclear safety. The UAE also seeks IAEA technical assistance in the areas of safeguards, physical protection, nuclear safety and liability, as well as in the assessment of potential technology options and appropriate managerial approaches.

In addition, the UAE has concluded multiple bilateral agreements with other governments for cooperation in the nuclear field, including agreements with France (2008), China (2009), the Republic of Korea (2009), the United States of America (2009), the United Kingdom (2010), Australia (2012), Canada (2012), the Russian Federation (2012), Argentina (2013), Japan (2013) and the Kingdom of Saudi Arabia (2019).

The UAE is working through multiple initiatives which aim at deterring terrorists from using the world’s seaports to ship illicit materials. It also focuses on detecting nuclear or radioactive materials if shipped via sea cargo and interdicting harmful shipments. Furthermore, the UAE is a member of the Proliferation Security Initiative (PSI), which is aimed at stopping shipments of weapons of mass destruction, their delivery systems and related materials worldwide. The UAE is also a member of the International Framework for Nuclear Energy Cooperation (IFNEC), as well as the Global Initiative to Combat Nuclear Terrorism (GICNT).

FANR continues to cooperate with nuclear regulatory bodies and expert organizations in operating countries (Australia, Belgium, Canada, China, Finland, France, the Kingdom of Saudi Arabia, the Republic of Korea, Spain, United Kingdom and the United States of America). The cooperation covers the exchange of technical information regarding safety, security and safeguards matters as well as facilitating the exchange of personnel for training purposes.

FANR has sought to cooperate not only bilaterally, but also with international institutions, namely the IAEA. With the IAEA, FANR has either invited or participated in peer review missions that assess the UAE's adherence to the IAEA's international standards. FANR has so far received 11 review missions conducted by the IAEA:

- Integrated Nuclear Infrastructure Review Mission (INIR) in 2011;
- Integrated Regulatory Review Service (IRRS) mission in 2011;
- Safeguards Advisory Service (ISSAS) Mission in 2014;
- IRRS follow-up review in 2015;
- Emergency Preparedness Review (EPREV) mission in 2015;
- Occupational Radiation Protection Appraisal Service (ORPAS) in 2015;
- International Physical Protection Advisory Service (IPPAS) in 2016;
- (pre-) Operational Safety Review Team (OSART) in 2017;
- Education and Appraisal Mission (EduTA) in 2017;
- INIR Phase 3 mission in 2018;
- Emergency Preparedness Review Follow-up Mission (EPREV) in 2019;
- pre-OSART follow-up mission for Units 1 and 2 of the Barakah NPP in 2022;
- Extended Occupational Radiation Protection Appraisal Service (ORPAS) followup in 2022.

In accordance with the UAE commitment on nuclear safety and radiation protection, FANR has taken part in IAEA Review Meetings on the Convention on Nuclear Safety and the Joint Convention on the Safety of Spent Fuel Management and on the Safety of Radioactive Waste Management since 2009.

Furthermore, during November 2015, an Administrative Arrangement between the Ministry of Foreign Affairs of the UAE and the Australian Safeguards and Non-Proliferation Office was concluded, pursuant to the bilateral agreement between the two Governments previously signed in 2012. This agreement allows for Australian uranium exports to the UAE for the UAE Peaceful Nuclear Energy Programme.

3. NATIONAL LAWS AND REGULATIONS

3.1. REGULATORY FRAMEWORK

3.1.1. Regulatory Authority(s)

During September 2009, the late Sheikh Khalifa bin Zayed Al Nahyan, President of the UAE (2004–2022) approved Federal Law by Decree No. (6) of 2009, Concerning the Peaceful Uses of Nuclear Energy. This law established the Federal Authority for Nuclear Regulation as the UAE's nuclear regulatory body. FANR is the independent government body charged with regulating and licensing nuclear activities in the UAE, which in addition to the nuclear energy programme, includes radioactive material and radiation sources used in medicine, research, oil exploration and other industries.

FANR determines all matters relating to the control and supervision of the nuclear sector in the UAE, in particular nuclear safety and security, radiation and environmental protection and safeguards. All obligations under the relevant international treaties, conventions or agreements entered into by the UAE are carried out by FANR. The FANR Board of Management (BoM) is composed of eight members, including a Chair and Deputy Chair. All members are appointed by the Minister's Cabinet Resolution

and must be citizens of the United Arab Emirates. The Board of Management appoints the Director General and is responsible for managing the Federal Authority for Nuclear Regulation.

3.1.2. Licensing Process

The National Law provides requirements for the granting, revocation and suspension of licenses. The law prohibits any person from conducting any 'Regulated Activity' in the UAE unless licensed to do so by FANR. Regulated Activity includes the siting, construction, operation and decommissioning of nuclear facilities.

The law provides requirements for inspection and control of licensee activities, requiring FANR to establish a planned and systematic inspections programme and to conduct inspections covering all areas of regulatory responsibility to ensure that the operator is in compliance with the law, regulations and license conditions. In undertaking inspections, FANR has the power to undertake enforcement actions, which are defined by the law as including corrective actions, written warnings, revocation of a license and administrative penalties and fines. The law includes provisions for civil liabilities and criminal penalties for various offences related to the requirements of the nuclear law.

FANR has issued a number of licences to Emirates Nuclear Energy Company and ENEC Operations (licensed as Nawah Energy Company), which remain current:

- Licence for the Selection of a Site for the Construction of Nuclear Facilities – February 2024 (ENEC)
- Licence for the Selection of a Site for the Construction of a Fuel Assembly Fabrication Facility – July 2023 (ENEC)
- Amended Licence for the Operation of Unit One of the Barakah Nuclear Power Plant – February 2020 (Nawah)
- Amended Licence for the Operation of Unit Two of the Barakah Nuclear Power Plant – March 2021 (Nawah)
- Licence for the Operation of Unit Three of the Barakah Nuclear Power Plant – June 2022 (Nawah)
- Licence for the Operation of Unit Four of the Barakah Nuclear Power Plant – November 2023 (Nawah)

3.2. MAIN NATIONAL LAWS AND REGULATIONS IN NUCLEAR POWER

Main laws in nuclear power:

- *Nuclear law, establishing responsibilities for different areas;*
- *Civil nuclear liability;*
- *Establishing a regulatory body;*
- *Implementing IAEA safeguards;*
- *Rules for environmental protection;*
- *Protection of intellectual property rights;*
- *Import and export controls of nuclear material and items;*
- *Security principles, including physical protection of nuclear material and facilities and protection of sensitive information;*
- *Roles of national government, local government and stakeholders;*
- *Other publications or strategies relevant to national nuclear energy development or projections.*

Main regulations in nuclear power:

- *Regulation for establishing an authorization system, responsibilities of the operator, inspection and enforcement;*
- *Site selection and approval;*
- *Radiation protection, including protection of the public, employees and the environment;*
- *Safety of nuclear installations;*
- *Radioactive waste and spent fuel management, including storage and disposal;*
- *Decommissioning, including funding and institutional control;*
- *Emergency preparedness;*
- *Transport of radioactive material.*

The legislative framework includes three types of instruments: laws adopted within the UAE, multilateral instruments to which the UAE has become a party or is taking steps to join and bilateral agreements with States that will be participating in the UAE programme. The following list of instruments include:

Laws of the United Arab Emirates:

- Federal Law by Decree No. (6) of 2009 Concerning the Peaceful Uses of Nuclear Energy, which came into effect on 24 September 2009 (referred to as the Nuclear Law).
- Law No. (21) of 2009 Establishing the Emirates Nuclear Energy Corporation, issued on 20 December 2009.
- Federal Law No. (24) of 1999 for the Protection and Development of the Environment, issued 17 October 1999.
- Law No. (14) of 2007 Concerning the Establishment of the Critical National Infrastructure Authority and Law No. (1) of 2012 transferring its functions and responsibilities to the Critical Infrastructure and Coastal Protection Authority (CICPA).
- Federal Law by Decree No (4) of 2012 Concerning Civil Liability for Nuclear Damage.

SUMMARY OF THE UAE NUCLEAR LAW

The Federal Law by Decree No. 6 of 2009 Concerning the Peaceful Uses of Nuclear Energy

- Affirms UAE commitment to develop and control the nuclear sector towards peaceful purposes only and in accordance with policy and international treaties and agreements; the highest priority given to safety, nuclear safety, radiation protection and safeguards enrichment and reprocessing forbidden in the UAE;
- Establishes and empowers the Federal Authority for Nuclear Regulation as an independent regulator to determine all matters relating to the regulation, inspection, and oversight of the nuclear sector with respect to safety, nuclear safety, nuclear security, radiation protection and safeguards;
- Defines the requirements relating to nuclear safety, radiation safety, safeguards and nuclear security;
- Determines civil and criminal penalties, including penalties consistent with the Convention on Physical Protection of Nuclear Material.

The relevant IAEA safety standards and security guidance that have served as the basis for many of the regulations related to nuclear installations which FANR has issued are listed below:

- FANR REG-01 Version 1, Leadership and Management for Safety in Nuclear Facilities;
- FANR REG-02, Siting of Nuclear Facilities;
- FANR REG-03, Design of Nuclear Power Plants;

- FANR REG-04 Version 1, Radiation Dose Limits and Optimization of Radiation Protection for Nuclear Facilities;
- FANR REG-05, Application of Probabilistic Risk Assessment at Nuclear Facilities;
- FANR REG-06, Application for a License to Construct a Nuclear Facility;
- FANR REG-08 Version 2, Physical Protection of Nuclear Material and Nuclear Facilities and on Cyber Security;
- FANR REG-09 Version 1, Export and Import Control of Nuclear Material, Nuclear Related Items and Nuclear Related Dual-Use Items;
- FANR REG-10, System of Accounting for and Control of Nuclear Material and Application of Additional Protocol;
- FANR REG-11, Radiation Protection and Predisposal Radioactive Waste Management in Nuclear Facilities;
- FANR REG-12 Version 1, Emergency Preparedness for Nuclear Facilities;
- FANR REG-13 Version 1, Safe Transport of Radioactive Material;
- FANR REG-14, Application for a Licence to Operate a Nuclear Facility;
- FANR REG-15, Requirements for Off-Site Emergency Plans for Nuclear Facilities;
- FANR REG-16, Operational Safety Including Commissioning;
- FANR REG-17 Version 1, Certification of Operating Personnel at Nuclear Facilities;
- FANR REG-19, Existing Exposure Situations;
- FANR REG-21, Decommissioning of Facilities;
- FANR REG-23 Version 1, Security of Radioactive Sources;
- FANR REG-24 Version 1, Basic Safety Standards for Facilities and Activities Involving Ionizing Radiation Other Than in Nuclear Facilities;
- FANR REG-26, Pre-disposal Management of Radioactive Waste;
- FANR-REG-27, Disposal of Spent Fuel and Radioactive Waste;
- FANR REG-29, Registration and Licensing of Radiation Sources;
- FANR REG-30, Regulation on Technical Services Related to Radiation Safety.

APPENDIX 1. INTERNATIONAL, MULTILATERAL AND BILATERAL AGREEMENTS

International Treaties

Agreement : Amendment to the Convention on the Physical Protection of Nuclear Material
Countries : United Arab Emirates
Signature Date : 2009-12-31
Ratification Date :
In-Force Date :
Notes :

Agreement : Comprehensive Nuclear-Test-Ban Treaty (CTBT),
Countries : United Arab Emirates
Signature Date : 2000-12-31
Ratification Date :
In-Force Date :

Notes :

Agreement : Comprehensive Safeguards Agreement between the United Arab Emirates and the International Atomic Energy Agency
Countries : United Arab Emirates
Signature Date : 2003-12-31
Ratification Date :
In-Force Date :
Notes :

Agreement : Convention on Assistance in the Case of a Nuclear Accident or Radiological Emergency,
Countries : United Arab Emirates
Signature Date : 1987-12-31
Ratification Date :
In-Force Date :
Notes :

Agreement : Convention on Early Notification of a Nuclear Accident
Countries : United Arab Emirates
Signature Date : 1987-12-31
Ratification Date :
In-Force Date :
Notes :

Agreement : Convention on Nuclear Safety
Countries : United Arab Emirates
Signature Date : 2009-12-31
Ratification Date :
In-Force Date :
Notes :

Agreement : Convention on Supplementary Compensation for Nuclear Damage (CSC),
Countries : United Arab Emirates
Signature Date : 2014-12-31
Ratification Date :
In-Force Date :
Notes :

Agreement : Convention on the Physical Protection of Nuclear Material
Countries : United Arab Emirates
Signature Date : 2004-12-31
Ratification Date :
In-Force Date :

Notes :

Agreement : Joint Convention on the Safety of Spent Fuel Management and on the Safety of Radioactive Waste Management
Countries : United Arab Emirates
Signature Date : 2009-12-31
Ratification Date :
In-Force Date :
Notes :

Agreement : Joint Protocol on the Application of the Vienna Convention and Paris Convention
Countries : United Arab Emirates
Signature Date : 2012-12-31
Ratification Date :
In-Force Date :
Notes :

Agreement : Protocol to Amend the 1963 Vienna Convention on Civil Liability for Nuclear Damage
Countries : United Arab Emirates
Signature Date : 2012-12-31
Ratification Date :
In-Force Date :
Notes :

Agreement : Ratification of the Additional Protocol to the Comprehensive Safeguards Agreement between the United Arab Emirates and the International Atomic Energy Agency
Countries : United Arab Emirates
Signature Date : 2009-12-31
Ratification Date :
In-Force Date :
Notes :

Agreement : Treaty on the Non-Proliferation of Nuclear Weapons (NPT),
Countries : United Arab Emirates
Signature Date : 1995-12-31
Ratification Date :
In-Force Date :
Notes :

Agreement : United Nations International Convention for the Suppression of Acts of Nuclear Terrorism
Countries : United Arab Emirates
Signature Date : 2005-12-31
Ratification Date :
In-Force Date :

Notes :

Other Relevant International Treaties

Agreement : Agreement for Cooperation in the Peaceful Uses of Nuclear Energy
Countries : Japan, United Arab Emirates
Signature Date : 2013-05-02
Ratification Date :
In-Force Date :
Notes :

Agreement : Agreement for Cooperation Concerning Peaceful Uses of Nuclear Energy
Countries : United Arab Emirates, United Kingdom
Signature Date : 2009-05-21
Ratification Date :
In-Force Date :
Notes :

Agreement : Agreement for Cooperation in the Development of Peaceful Uses of Nuclear Energy
Countries : France, United Arab Emirates
Signature Date : 2008-01-15
Ratification Date :
In-Force Date :
Notes :

Agreement : Agreement for Cooperation in the Peaceful Uses of Nuclear Energy
Countries : Ireland, United Arab Emirates, United Kingdom
Signature Date : 2010-11-25
Ratification Date :
In-Force Date :
Notes :

Agreement : Agreement for Cooperation in the Peaceful Uses of Nuclear Energy
Countries : Saudi Arabia, United Arab Emirates
Signature Date : 2019-11-27
Ratification Date :
In-Force Date :
Notes :

Agreement : Agreement for Cooperation in the Peaceful Uses of Nuclear Energy

Countries : Korea, Republic of, United Arab Emirates
Signature Date : 2009-06-22
Ratification Date :
In-Force Date :
Notes :

Agreement : Agreement for Cooperation in the Peaceful Uses of Nuclear Energy
Countries : Canada, United Arab Emirates
Signature Date : 2012-09-18
Ratification Date :
In-Force Date :
Notes :

Agreement : Agreement on Cooperation in the Field of the Use of Nuclear Energy for Peaceful Purposes
Countries : Russian Federation, United Arab Emirates
Signature Date : 2012-12-17
Ratification Date :
In-Force Date :
Notes :

Agreement : Agreement on Cooperation in the Peaceful Uses of Nuclear Energy
Countries : Argentina, United Arab Emirates
Signature Date : 2013-01-14
Ratification Date :
In-Force Date :
Notes :

Agreement : Agreement on Cooperation in the Peaceful Uses of Nuclear Energy,
Countries : Australia, United Arab Emirates
Signature Date : 2012-07-31
Ratification Date :
In-Force Date :
Notes :

Agreement : Memorandum of Understanding for Cooperation in Peaceful Uses of Nuclear Energy
Countries : Ireland, United Arab Emirates, United Kingdom
Signature Date : 2008-05-15
Ratification Date :
In-Force Date :
Notes :

APPENDIX 2. MAIN ORGANIZATIONS, INSTITUTIONS AND COMPANIES INVOLVED IN NUCLEAR POWER RELATED ACTIVITIES

National Authorities

Organization Name	Address	Contact	Website
Ministry of Climate Change & Environment (MOCCAE)	PO Box: 1509 Abu Dhabi, United Arab Emirates	+917 2 444 4747	
Department of Health (DOH)	PO Box: 5674 Abu Dhabi, United Arab Emirates	+971 2 449 333	
Ministry of Cabinet Affairs and the Future (MOCAF)	PO Box: 899 Abu Dhabi, United Arab Emirates	+917 2 403 9999	
Environment Agency - Abu Dhabi (EAD)	PO Box: 45553 Al Mamoura Building, Muroor Road Abu Dhabi, United Arab Emirates	+971 2 445 4777	
Dubai Health Authority (DHA)	PO Box: 4545 Dubai, United Arab Emirates	+971 4 337 0031	
Permanent Mission of the UAE to IAEA	Chimanistrasse 36, 1190, Vienna – Austria	+4317150028	
Federal Authority for Nuclear Regulation (FANR)	PO Box: 112021 Abu Dhabi, United Arab Emirates	+971 2 651 6666	
Emirates Nuclear Energy Corporation (ENEC) ENEC headquarters	PO Box: 112010 Masdar City Abu Dhabi, United Arab Emirates	+ 971 2 313 0555	
National Emergency Crisis and Disaster Management Authority (NCEMA)	PO Box: 113811 Abu Dhabi, United Arab Emirates	+917 2 417 7000	
Critical Infrastructure and Coastal Protection Authority (CICPA)	PO Box: 62220 Airport Road Al Bateen Air Base Abu Dhabi, United Arab Emirates	+971 2 655 5555	
Ministry of Energy & Infrastructure	Al Nahda Street - Al Qusais 1 Dubai, United Arab Emirates	Fax: 97142125470 Call Center: 800-6634	
National Centre for Meteorology (NCM)	PO Box: 4815 Abu Dhabi, United Arab Emirates	+971 2 222 7777	
Ministry of Foreign Affairs & International Cooperation (MOFAIC)	PO Box: 1 Abu Dhabi, United Arab Emirates	80044444	

Universities

Organization Name	Address	Contact	Website
Khalifa University (KU)	PO Box: 127788 Abu Dhabi, United Arab Emirates	+971 2 401 8000	

REFERENCES

Number	Source	Link
[1]	The UAE is a signatory to the Proliferation Security Initiative (PSI)	

[2] "ENEC and KEPCO Announce Financial Close for Barakah Nuclear Energy Plant"
[3] The UAE State of Energy Report 2019
[4] "The Largest Oil Reserves By Country"
[5] Board of Management
[6] Natural Gas - Proved Reserves (cu m) 2019 Country Ranks
[7] A Federal Law By Decree No. 6 of 2009 Concerning the Peaceful Uses of Nuclear energy
[8] Policy of the United Arab Emirates on the Evaluation and Potential Development of Peaceful Nuclear Energy

Not Applicable

COORDINATOR INFORMATION

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