



Policy of the United Arab Emirates on the  
Evaluation and Potential Development of  
Peaceful Nuclear Energy

The UAE's interest in evaluating nuclear energy is motivated by the need to develop additional sources of electricity to meet future demand projections and to ensure the continued rapid development of its economy.

Recent analysis conducted by official UAE entities has concluded that national annual peak demand for electricity is likely to rise to more than 40,000 MW's by 2020, reflecting a cumulative annual growth rate of roughly 9% from 2007 onward.



Based upon these projections the UAE has taken steps to evaluate viable options to meet future demand. As part of this evaluation, it was determined that known volumes of natural gas that could be made available to the nation's electricity sector would be insufficient to meet future demand, providing adequate fuel for only 20,000-25,000 MW's of power generation capacity by 2020. While the burning of liquids (e.g., crude oil and/or diesel) was found to be logistically viable, evaluation of this option revealed that a heavy future reliance on liquids would entail extremely high economic costs, as well as a significant degradation in the environmental performance of the UAE's electricity sector. While the evaluation of coal-fired power generation established its lower relative price compared to liquids-fired power generation, its widespread use within the UAE would have an even more severe detrimental effect on environmental performance, while also raising thorny issues related to security of supply. Evaluation of alternative energies, including solar and wind suggested that, while these options could be deployed within the UAE, even aggressive development could only supply 6-7% of peak electricity demand by 2020.

Stacked against the above options, nuclear power-generation emerged as a proven, environmentally promising and commercially competitive option which could make a significant base-load contribution to the UAE's economy and future energy security.

It is on the basis of this analysis that the UAE is establishing a Nuclear Energy Program Implementation Organization (NEPIO) as recommended by the International Atomic Energy Agency (IAEA), and is proceeding to evaluate the establishment of a peaceful nuclear program that would make the potential benefits of nuclear power available to the people of the UAE.

Nevertheless, the Government of the UAE is acutely aware of the special circumstances and considerations that surround not only the deployment of nuclear reactors, but also the simple evaluation of such a possibility. Accordingly, the Government of the UAE desires to make clear its peaceful and unambiguous objectives in respect both of its current evaluation of a peaceful nuclear energy program as well as the potential future deployment of actual nuclear power generation facilities. Further, the Government of the UAE also wishes to emphasize that nuclear energy represents only one of several options currently being evaluated; as the UAE seeks to meet future energy needs and develop a diversified and secure portfolio of power-generation assets.

In order, however, to make clear its intentions with specific regard to nuclear power, the Government of the UAE has prepared and formally endorses the following policy statement as a reflection of its views on the potential establishment of a peaceful civilian nuclear energy program in the UAE.

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

The policies and actions described in this document are of two kinds: those that are currently being implemented or will be implemented as part of the UAE's ongoing evaluation of nuclear power and those which would be undertaken only in the event that the UAE chose to deploy nuclear facilities within its borders. Through the adoption and/or implementation of these policies and actions, the Government of the UAE hopes to establish a new model via which non-nuclear states may explore and potentially deploy nuclear energy with the full support and confidence of the international community.

## 1. The UAE Is Committed To Complete Operational Transparency

As a country evaluating a nuclear power program, the UAE recognizes that a commitment to complete operational transparency is essential to gain domestic support and assure the international community, potential bilateral partners and international nuclear supervisory bodies of the peaceful intentions of any nuclear program undertaken by the UAE.

As a first step in its commitment to complete operational transparency, and in accordance with the guidance of the International Atomic Energy Agency (IAEA), the UAE will establish a Nuclear Energy Program Implementation Organization (NEPIO) to evaluate and potentially implement a peaceful nuclear energy program within the UAE. This entity, the Emirates Nuclear Energy Corporation (ENEC), will be created by law as a civilian, publicly held entity with its own legal personality and will be directed by a board of directors with representation from relevant bodies including Government entities, utilities, environmental agencies, etc. Transparency vis-à-vis UAE stakeholders will be ensured through the provision of opportunities for consultations as well as by the right to comment and appeal decisions of the NEPIO. Further, ENEC will also assemble an international advisory board made up of international experts in the fields of nuclear regulation, safety, security, non-proliferation, the development of human resources in the nuclear sector, and waste management. The international advisory board is expected to provide high-level guidance in the evaluation of nuclear power, as well as in the initial phases of eventual nuclear power plant acquisition, design, and construction, and the development of required human capital. It is important to note that this advisory role will supplement, but not replace, the comprehensive national capability which will result from the establishment and staffing of appropriate national institutions (e.g., regulatory authority and NEPIO) possessing the required skills and expertise for the safe and successful development of any domestic nuclear program.

ENEC will be mandated to commission and direct required studies and research to fully evaluate the potential development of a peaceful nuclear power sector in the United Arab Emirates. Should that evaluation lead to an affirmative decision to actually deploy nuclear power plants in the UAE, ENEC would also be charged with directing programs and initiatives to develop the necessary human, technical and security infrastructure (including for the secure transport of nuclear materials and equipment) that would be required to

support a safe and secure domestic nuclear power sector. In order to ensure the quality and thoroughness of both the evaluation and infrastructure development activities described above, the ENEC will be created with a capitalization of AED 375 million (roughly USD 100 million) and will have the ability to obtain further capital as deemed appropriate and as required in order to carry out its mandate.

As a second step in its commitment to operational transparency, the UAE will conclude all required international instruments and abide strictly by the resulting obligations. To this end, preliminary discussions have been initiated with the IAEA. In order to provide the necessary domestic complement to each and every international instrument, and ensure their direct and complete transference into national law, the UAE will also draft a comprehensive national nuclear law. Among other functions, the national law will provide legal authority for the establishment of a fully independent nuclear regulatory authority, an institution critical to safeguard and sustain operational transparency in a nuclear energy sector.

As an additional mechanism to secure transparency in the day-to-day operation of any future nuclear power plants, the UAE would offer joint-venture arrangements to foreign investors for the construction and operation of future nuclear power plants. The involvement of experienced and reputable foreign commercial partners in the construction and operation of any eventual nuclear plants would provide a continuous and fully transparent window into the UAE nuclear sector and make it virtually impossible for any party to misconstrue or misinterpret the UAE's nuclear activities. Further, should the UAE opt to deploy nuclear power plants, it will only consider partnerships with companies having a history of transparent operations and a reputation for excellence in safety, and whose national Governments are parties to the Treaty on the Nonproliferation of Nuclear Weapons and have negotiated and implemented safeguards agreements as required by the Treaty.

Finally, aware of the issues raised by nuclear power in respect of health, safety and the environment, and desiring that decisions leading to the potential development of nuclear power be grounded in the acceptance of its citizens, the UAE will take the steps necessary to ensure effective public information and engagement. Transparent communication vis-à-vis the general public will also be bolstered by effective communication with Governmental and appropriate expert organizations, neighboring countries and the larger international community.

### **Adoption of all required international agreements and strict abidance of the resulting obligations**

While the UAE has in the past acceded to and ratified a number of international agreements in the nuclear sphere, including the United Nations Treaty on Non-Proliferation of Nuclear Weapons (NPT), a full-scope IAEA Safeguards Agreement and others, the UAE is prepared to undertake further obligations to underpin the establishment of a peaceful and transparent nuclear energy program. Consultation with the IAEA has established that the international agreements necessary to provide a principled foundation to the UAE nuclear program include instruments from the IAEA, United Nations and Nuclear Suppliers Group. These can be broadly categorized into instruments pertaining to (1) security and non-proliferation; (2) safety; and (3) liability.

#### **(1) Security and Non-proliferation**

The political commitment of the UAE to peaceful use of nuclear power was made in 1995 upon accession to the NPT as well as ratification of the IAEA Safeguards Agreement in 2003. However, in order to enhance confidence as well as to generally support the non-proliferation efforts of the international community, the UAE will take immediate steps to adopt and enforce all major international non-proliferation instruments, including the IAEA Additional Protocol to the Safeguards Agreement, as it proceeds to evaluate a possible future domestic nuclear energy program.

The relevant instruments pertaining to security and non-proliferation cover enhanced safeguards, protection from theft of nuclear materials, and control of the supply of nuclear materials or equipment.

With regard to enhanced safeguards and in accordance with the IAEA Additional Protocol to the Safeguards Agreement, the UAE will strictly abide by the obligation to provide information covering all aspects of nuclear activities as well as any import of nuclear-related equipment and technology. Expanded inspection rights will be granted to the IAEA, including inspection of declared facilities as well as any undeclared facilities, and administrative procedures will be streamlined so that IAEA inspectors receive automatic visa renewal and can communicate more readily with IAEA headquarters.

With regard to physical protection, given the severe consequences resulting from misappropriation of nuclear material and to supplement its ratification of the IAEA Convention on Physical Protection, the UAE will become a signatory to the IAEA Amendment to the Convention on Physical Protection. Pursuant to obligations under

the Conventions, the UAE will establish a regime of physical protection, and commit to effectively protecting nuclear materials in domestic use as well as during international transport across its territory. Moreover, any offence involving theft, robbery, and smuggling of nuclear material or sabotage of nuclear facilities will be treated as criminal under UAE law and be subject to severe penalties. At an inter-Governmental level, the UAE will also undertake expanded international cooperation with other members of the Convention in connection with rapid location and recovery of stolen or smuggled nuclear material, mitigation of any radiological consequences of sabotage, and prevention and combat of related offences.

With regard to control of trade, the UAE will continue to strengthen its export control regime to block and respond effectively to illicit trade of nuclear material or equipment. To this end, the UAE will implement commitments under the NPT, the IAEA Convention on the Physical Protection of Nuclear Material and the IAEA Joint Convention on the Safety of Spent Fuel Management and on the Safety of Radioactive Waste Management. As a means of ensuring the establishment and maintenance of the most comprehensive and up-to-date export control regime, the UAE will seek to participate in the Nuclear Suppliers Group (NSG) and implement import and export control rules for nuclear and nuclear-related equipment and technology in strict accordance with NSG Guidelines for Nuclear Transfers. In connection with the broader need to regulate trade, the UAE has recently established, under Federal Law No. 13 of 2007, a legal regime for commodities that are subject to import and export control procedures. Included within the scope of the law is a list of export-controlled technologies addressing nuclear materials, technologies and equipment.

Mindful of the importance of full implementation and enforcement of the above actions in the areas of safeguards, physical protection and control of trade, the UAE will provide whatever resources and efforts necessary to guarantee their effective implementation and enforcement in accordance with international norms. As a complement to the above, the UAE will also continue its efforts to fully implement UN Security Council Resolution 1540, which is legally binding on all UN Member States and requires the establishment of a comprehensive non-proliferation regime.

### Status of UAE Non-proliferation Commitments

#### Non-proliferation instruments concluded by the UAE:

- IAEA Treaty on Non-Proliferation of Nuclear Weapons (1995)
- IAEA Comprehensive Safeguards Agreement (2003)
- IAEA Convention on the Physical Protection of Nuclear Material (2003)
- UN Comprehensive Test Ban Treaty (2000)
- UN Security Council Resolution 1540 (2004)
- UN International Convention for the Suppression of Acts of Nuclear Terrorism (2005)

#### Non-proliferation instruments to be concluded by the UAE:

- IAEA Additional Protocol to Safeguards Agreement\*
- IAEA Amendment to the Convention on the Physical Protection\*
- NSG Export Guidelines\*\*

\* - to be concluded in tandem with the UAE's evaluation of peaceful nuclear energy.

\*\* - to be concluded only if the UAE chooses to deploy nuclear power plants.

Consistently with its intended policy in respect of security and physical protection, and in order to support and complement the convention-based obligations in the area of physical protection, the UAE will also make a commitment to participate in the IAEA Illicit Trafficking Database Program.

### (2) Nuclear Safety

In tandem with a commitment to reinforce non-proliferation obligations, the UAE will undertake all recommended international obligations in respect of ensuring safety of all nuclear activities. While two conventions on safety were concluded by the UAE in 1987 as a consequence of the Chernobyl incident, the two remaining major IAEA instruments on the safety of nuclear facilities and the safety of nuclear waste will be concluded as part of the UAE's evaluation of peaceful domestic nuclear program.

With regard to **safety of facilities**, as required by the IAEA Convention on Nuclear Safety, the UAE will implement a comprehensive regime that maintains a high level of safety according to international benchmarks and ensures that all nuclear-related installations are operated in a safe, well-regulated and environmentally sound manner. Further, should the UAE move beyond evaluation and implement a peaceful nuclear energy program, it will also establish a competent, independent and effective regulator charged with overseeing all activities in the nuclear energy sector.

With regard to **safety of radioactive waste**, as required by the IAEA Convention on Safety of Spent Fuel Management, and in the event that the UAE deploys nuclear power plants within its territory, it will maintain a high level of safety in the management of spent fuel and radioactive waste. In such a scenario, appropriate measures would be established to ensure protection against radiological hazards at all stages of spent fuel and radioactive waste management and emergency plans would be implemented at waste management and spent fuel facilities.

**Status of UAE Nuclear Safety Commitments**

**Safety instruments concluded by the UAE:**

- IAEA Convention on Early Notification of a Nuclear Accident (1987)
- IAEA Convention on Assistance in the Case of a Nuclear Accident or Radiological Emergency (1987)

**Safety instruments to be concluded by the UAE:**

- IAEA Convention on Nuclear Safety\*
- IAEA Joint Convention on the Safety of Spent Fuel Management\*

\* - to be concluded in tandem with the UAE's evaluation of peaceful nuclear energy.

**Status of UAE Nuclear Liability Commitments**

**Liability instruments to be concluded by the UAE:**

- IAEA Vienna Convention on Civil Liability for Nuclear Damage\*\*
- IAEA Protocol to Amend the Vienna Convention on Civil Liability\*\*
- IAEA Joint Protocol on the Application of the Vienna and Paris Conventions\*\*
- IAEA Convention on Supplementary Compensation for Nuclear Damage\*\*

\*\* - to be concluded only if the UAE chooses to deploy nuclear power plants.

**(3) Nuclear Liability**

The UAE recognizes that dealing with eventual nuclear liability claims under existing national compensation laws is greatly limited by the unique character of the risks posed by leakages of radioactive material. Such leakages can produce effects reaching across borders, and it may take decades for the effects of exposure to radiation to manifest. Consequently, as a third critical element underpinning the potential establishment of a peaceful nuclear energy program, the UAE would introduce a regime of nuclear liability that complies with the major international instruments governing the area of nuclear liability. The establishment of any UAE nuclear energy program would therefore be accompanied by the introduction of a separate nuclear liability regime for third-party compensation modeled on the four as-yet un-ratified IAEA instruments on nuclear liability, with possible modifications to accommodate foreign joint-venture partners. (See description of joint venture operations below).

The transposition into UAE law of obligations contained in nuclear liability conventions will incorporate the fundamental principles contained in those conventions, namely (1) the channeling of the entire legal responsibility for nuclear damage exclusively towards the operator; (2) the possibility of establishing the operator's liability without having to prove negligence; (3) the exclusive jurisdiction of the courts of countries where the nuclear accident occurs; (4) the limitation of the amount of liability and the possibility of setting a time limit for such a liability; and (5) the compensation of damage without discrimination on the basis of nationality, domicile, or residence.

**Development of a comprehensive national legal framework covering all aspects of nuclear law, including safety, security, non-proliferation, nuclear liability and other legislative, regulatory and commercial aspects**

As a necessary complement to the conclusion of the above-described international agreements, and drawing on the principles contained therein, any UAE nuclear program would also be supported by the drafting of comprehensive domestic nuclear legislation to govern the nuclear sector and define fundamental matters concerning the utilization of nuclear energy and safety regulations. The major areas within the scope of UAE nuclear legislation would include: establishment of a regulatory authority and licensing regime; nuclear liability; responsibilities of licensees and operators; management of radioactive waste and spent fuel; decommissioning of nuclear facilities; physical protection of nuclear materials; and non-proliferation obligations, controls and enforcement. With regard to security, the scope of nuclear legislation would also extend to prohibiting the unlawful use of radiation sources within the territory of the UAE and providing for the punishment of offenders in the event of unlawful use.

### **Establishment of an independent and effective regulatory authority**

The UAE believes that the establishment of an independent, vigilant and effective regulatory authority is a cornerstone for any stable, credible, safe and secure nuclear energy program. Accordingly, a primary UAE objective, in the event that the UAE chose to commission nuclear power plants within its territory would be to establish a body authorized and competent to exercise supervision over nuclear safety independently of manufacturers and operators.

Conscious of its critical role in maintaining credibility through independence and competence, the UAE envisages an extremely robust role for any nuclear regulatory body which would be endowed with the following IAEA-recommended powers to: (1) establish requirements and regulations; (2) issue licenses; (3) inspect and assess facilities and structures connected to facilities; (4) monitor and enforce compliance with regulations; and (5) establish a State System for Accounting and Control (SSAC) of nuclear material (including spent fuel and radioactive waste) in accordance with IAEA Safeguards obligations. Among its other duties, the regulatory body would also be tasked with communicating with the IAEA on an on-going basis to provide, for example, reports required by international agreements signed by the UAE as well as technical information concerning any nuclear material and facilities.

- (1) The **establishment of requirements and regulations** governing the nuclear energy sector would constitute a core area of activity, with regulations comprehensively covering nuclear safety, non-proliferation, nuclear items, physical protection, radiation protection and emergency preparedness on the premises of nuclear installations. Furthermore, in light of the importance of securing a sufficient knowledge base to avoid shortages of skilled personnel and enable the regulatory authority to discharge its tasks competently, a strategy for knowledge development would also be integrated into any wider nuclear energy plan.
- (2) The **licensing scope and authority** would be extensive, in accordance with international best practices in the nuclear energy sector. Safety licenses would be required for all stages, including siting, construction, enlargement, commissioning, operation, waste management, modification, shutdown, and decommissioning of nuclear facilities, and the process of issuing a license would be characterized by thoroughness and a pervasive culture of safety.

In regard to non-proliferation and control of materials, specific and stringent license requirements would be introduced on keeping inventories of nuclear material, provision of records, reports and co-operation with inspectors.

- (3) The **inspection powers** mandated to the regulatory authority would allow for the establishment of a systematic inspection program and would authorize access to all facilities, contractor personnel involved in the project, equipment and all documents. Further, the regulatory authority would have the power to conduct inspections on both a planned and unannounced basis, and would require full documentation of the results.
- (4) The **enforcement instruments** at the disposal of the regulatory authority would be sufficiently robust to induce compliance with regulations. Legislation would clearly and explicitly assign enforcement powers to the regulatory authority, enabling the authority to develop the enforcement mechanism of applicable regulations and of the terms of licenses, including suspension, modification or revocation.
- (5) The oversight of the **State System of Accounting and Control (SSAC)** of nuclear material required by the IAEA Safeguards regime would constitute another of the core functions of the regulatory authority. As per IAEA specifications, the SSAC would include a measurement system; a system for the evaluation of accuracy; procedures for reviewing measurement differences; procedures for carrying out physical inventories; a system for the evaluation of unmeasured inventories; a records and reports system for all material balance areas; and a system of reporting to the IAEA.

### **Safeguarding the independence of the regulatory authority**

Mindful of the imperative to guarantee regulatory independence to the international community, in the context of any nuclear energy program the UAE would create a designated authority to regulate the nuclear sector and take the steps necessary to guarantee its independence from operators, licensees, Government, and any other body or organization concerned with the promotion or utilization of nuclear energy or involved in spent fuel or radioactive waste management. The institutional characteristics designed to ensure independence would cover (1) the appointment system; (2) budgetary adequacy and independence; (3) technical



independence; and (4) independence from Government. Any nuclear sector developed by the UAE would be regulated by a federal authority exhibiting the following characteristics guaranteeing and preserving its independence:

- (1) The **appointment system** for high-level regulatory authority staff would be designed to ensure independence, with appointments made for a defined period and with clear and limited removal criteria such as for dereliction of duties, conflict of interest and corruption. Operators and licensees would have no control over the appointment of members to the regulatory authority, and would not be afforded any possibility to exert undue influence over appointments. International regulatory experts with established integrity would be actively recruited to the new authority.
- (2) The **budgetary adequacy and independence** of the regulatory authority would be secured by ensuring that the financial resources available to the UAE regulatory authority were sufficient, predictable and not subject to undue control by external bodies. The regulatory authority would have the ability to develop its own budget and make the case vis-à-vis the Government for the level of funding necessary for the effective implementation of its responsibilities.
- (3) The **technical independence** of the regulatory authority would be enhanced by ensuring the provision of the necessary capabilities to make complex technical judgments in the performance of its review and assessment, licensing, inspection or enforcement responsibilities. To the extent the regulatory authority may be compelled to rely in some instances on the assessments of others, arrangements would be made to ensure that those providing them are effectively independent of the operator, licensee or government.
- (4) The **independence from Government** of the regulatory authority would be achieved through employing the most appropriate reporting structures and systems. Such systems would be explicitly designed to avoid direct Ministerial control over nuclear safety regulation.

**Should the UAE proceed with the development of a peaceful nuclear energy program and the creation of a regulatory authority, the former will enlist the assistance of the IAEA and other competent bodies to ensure that the approach chosen by the UAE in fostering the independence, capability and competence of the authority fully reflects current international best practices.**

#### **Offering joint-venture arrangements for operating nuclear power plants**

The past experience of the UAE, particularly in the oil production and electricity generation sectors, has been characterized by successful cooperation with international companies from the United States, Europe and Asia. In light of these positive experiences, and in order to secure the most efficient, transparent and investor-friendly manner of operating nuclear energy plants, any nuclear energy program in the UAE would seek to establish similar international partnerships for the operation of nuclear energy facilities.

Accordingly, any commitment to a nuclear energy program would involve designing arrangements between the Government and international companies similar to the currently-employed Independent Water and Power Producer (IWPP) structures. IWPPs have a successful history in the Emirate of Abu Dhabi, having been introduced in the water and electricity sector as part of a Government-supported privatization effort aimed at increasing the sector's efficiency by allowing power-generation facilities to operate as independent, private-sector enterprises. Under the IWPP structure, new plants are constructed on a build, own and operate (BOO) basis via joint venture arrangements between the Government and various international companies. Under current arrangements, in each IWPP a 60 per cent shareholding is retained by the Government while the remaining 40 per cent shareholding is owned by overseas private investors.

In practice, joint venture companies involved in an IWPP continue to operate the plant via an arrangement with a plant operator (usually one of the private investors) with relevant experience and capabilities in the operation and maintenance of such facilities. As such, participation in the construction of a nuclear power-generation facility would not only create significant opportunities for reactor design and construction companies, but also long-term operation opportunities for qualified operators, as well as a secure investment for equity holders. From the perspective of guaranteeing that safety and non-proliferation standards are met, eventual IWPPs in the nuclear energy sector would remain fully subject to international standards and regulatory oversight, despite their differentiated shareholding structure.

In contemplating the operation of nuclear power plants via joint venture partnerships that include both domestic and foreign entities, the UAE recognizes that it may be breaking new ground and may, as a result, need to develop innovative legislation and regulations to accommodate these structures. Further, while the IWPP structure described above has operated successfully within the UAE, the Government would be prepared to modify that structure or consider alternative structures if such structures were appropriate and of interest to overseas firms involved in the nuclear sector and if they contributed to the UAE's goal of promoting efficient, safe and transparent operations.

#### **Creating effective mechanisms for public information and engagement**

Aware of the imperative of maintaining open channels of communication with its citizens in the process of evaluating nuclear power, and mindful of the importance that decisions pertaining to the actual development of nuclear power be based on public trust and acceptance, the UAE will undertake to provide information to the public in a transparent, technically sound, accurate, reliable and understandable manner. This White Paper on the Policy of the United Arab Emirates on the Evaluation and Potential Development of Peaceful Nuclear Energy will be made available to the general public through publication on appropriate Government websites and represents the first step by the UAE Government in ensuring the timely and reliable flow of information to interested parties. Further mechanisms will be developed and implemented as the evaluation and potential implementation process advances.

The above commitments with regard to operational transparency would not extend to security-related measures and plans developed to ensure the physical security of any nuclear facilities, equipment or materials within the UAE. Such measures and plans would, of necessity, be treated as sensitive information and afforded appropriate protection in order to ensure the physical security of the facilities, equipment and materials referenced above.

## **2. The UAE Is Committed To Pursuing The Highest Standards Of Non-Proliferation**

In its ongoing evaluation of a nuclear power program, the UAE recognizes that a commitment to operational transparency must also be matched by an equivalent commitment to the highest standards of non-proliferation and their enforcement in accordance with international norms. At the outset, it is significant to note that the UAE made the political commitment to non-proliferation in 1995 upon accession to the NPT. Subsequently, a number of steps were taken in support of this commitment to non-proliferation, most notably the introduction of legal and institutional changes in partial fulfillment of UAE obligations under Security Council Resolution 1540.

#### **Building on existing non-proliferation approaches and activities**

As evidenced by its support for a number of non-proliferation initiatives and international instruments aimed at limiting the spread of weapons of mass destruction, the UAE considers non-proliferation to be of the highest importance. In support of this policy and in order to reflect its strong belief that the security of the nation, its neighbors and the world will best be protected by avoiding the spread of nuclear weapons and the technology to acquire them, the UAE Government has repeatedly and assertively stated that it is against the existence of weapons of mass destruction in the Middle East. Moreover, accession of the UAE to the NPT (1995), IAEA Comprehensive Safeguards Agreement (2003), and UN International Convention for the Suppression of Acts of Nuclear Terrorism (2005) demonstrate that the political commitment of the UAE to non-proliferation predates its evaluation of nuclear energy as a possible component of the electricity-generation mix.

Beyond the conclusion of the above international agreements, the UAE has also taken a number of legal and institutional steps to implement non-proliferation initiatives. For example, a number of concrete targets have been achieved in fulfillment of the commitments undertaken by the UAE in respect of UN Security Council Resolution 1540 (2004) to prevent non-state actors from acquiring or developing nuclear, biological and chemical weapons. The most significant legislative development introduced as a follow-up to UN Security Council 1540 has been the strengthening of the UAE export control regime. In August 2007, Federal Law No. 13 (2007) was introduced to regulate commodities that are subject to import and export control procedures. The law sets out schedules of export-restricted goods (including dual-use technologies), seeks

procedural standardization of controls throughout the different emirates of the UAE, and authorizes the establishment of a new control body, to be known as the National Commission for Commodities Subject to Import, Export and Re-export Control.

On the institutional front, steps have been taken to establish national committees tasked with non-proliferation oversight of radioactive substances and monitoring and follow-up in relation to the ban on the manufacture, possession, acquisition, transport, or use of any type of weapons by any non-State actor for terrorist purposes. Finally, a number of workshops and symposia have been organized in connection with the UAE's implementation of UN Security Council Resolution 1540. Among others, the topics covered by these initiatives include (1) the development of technical abilities to support the infrastructure for radioactive safety and waste (in collaboration with the IAEA); (2) radioactive prevention and security of nuclear materials (also in collaboration with the IAEA); and (3) monitoring of exports (several workshops with friendly nations).

Looking forward, in tandem with the process of evaluating a potential nuclear energy program, the UAE is also considering a number of potential steps that would further strengthen its commitment to non-proliferation. These steps, which include favoring proliferation-resistant technologies and designs, renouncing any intention to develop a domestic enrichment and reprocessing capability, developing a comprehensive waste management system, and possibly participating in the IAEA-initiated multilateral fuel-assurance network, are set out below.

#### **Favoring and supporting the development of future technologies and designs that are resistant to proliferation**

In addition to the long-standing political commitment to non-proliferation outlined above and specific approaches deriving from that commitment, the UAE will also favor and support the development of technologies and designs that potentially offer a strong reduction or negation of proliferation risks from a technical standpoint. As the UAE seeks to explore technology options for any nuclear program, high importance will be placed on innovative reactors and fuel cycle technologies that exhibit enhanced proliferation resistance. Accordingly, where possible, the UAE would proactively support the development of proliferation-resistant technology options.

#### **Renouncing an intention to develop a domestic enrichment and reprocessing capability and undertaking to source fuel from reliable and responsible foreign suppliers**

Unlike many countries having civilian nuclear energy programs, the UAE will not be involved in nuclear fuel-cycle activities beyond those that would be required for the management and disposal of radioactive waste in the event that the UAE deployed nuclear power plants within its territory. A number of factors underlie this view, including the economic infeasibility of operating enrichment and reprocessing facilities for comparatively small nuclear fleets, concerns from the international community regarding spent fuel reprocessing and enrichment plants in developing countries, and the dual-use nature of components employed in fuel fabrication and processing. In consideration of these factors, the UAE will not seek to develop domestic capabilities in those areas, either as part of its evaluation of nuclear energy or as a component of future UAE nuclear program.

In lieu of domestic enrichment and reprocessing, the UAE would seek to conclude long-term arrangements with reliable and responsible governments and contractors for the secure supply of nuclear fuel, as well as the safe and secure transportation and, if available, the disposal of spent fuel via fuel leasing or other emerging fuel supply arrangements.

#### **Development as required, of a comprehensive waste management system that reflects the highest standard of international practice and which does not include domestic reprocessing**

In terms of short-term fuel storage, the UAE would be committed to the highest standards of security and safety. However, as noted above, in light of the proliferation concerns associated with spent fuel, the UAE would prefer to source nuclear fuel via fuel leasing or similar arrangements that relieve it of the long-term requirement of safeguarding spent fuel. In any event, should long-term storage in the UAE be required, long-term spent fuel facilities would be built and managed under strict regulations to ensure the compatibility of the international safety standards of waste disposal. The generation of radioactive waste would be kept to a minimum possible by appropriate design measures and operating practices. Waste treatment and interim storage would be strictly controlled in a manner consistent with the requirements for safe final disposal. The UAE would also prefer using foreign suppliers' services, if offered, to reduce the volume of spent fuel to reduce permanent storage requirements. These services would be obtained under

the condition that all reprocessing takes place outside the UAE. Reprocessing will not be considered by the UAE in any nuclear energy program.

In keeping with this approach, the UAE would also support international efforts to develop a network of multi-lateral fuel assurances, possibly including a “last resort” fuel bank, which would provide insurance against nuclear fuel supply interruption for states with no indigenous enrichment facilities.

Setting aside the question of high-level waste associated with spent fuel, the UAE would develop appropriate mechanisms and facilities for the domestic disposal of all low and intermediate level waste generated by any future nuclear facilities.

### 3. The UAE Is Committed To The Highest Standards Of Safety And Security

As with a cross-cutting commitment to operational transparency and specific obligations pertaining to non-proliferation, the UAE considers that any nuclear energy program must involve equally robust standards of safety and security. Safety and security are to a large degree interconnected, since both are occupied with the central issue of preventing the consequences of a release of radioactivity from a nuclear reactor or from spent fuel. Moreover, the processes, systems and procedures designed to protect a facility from accidents in the course of normal operations are the same systems employed to prevent a release of radiation in the event of a terrorist attack. Accordingly, the UAE is of the view that any domestic nuclear energy program would require a commitment to the highest standards of safety and security and appreciates that maximum support for any nuclear energy program will rest upon the belief that safety and security issues in the sector will be responsibly and competently handled by national authorities.

#### **Operationally – via the highest standard of regulation and safety management across all aspects of the sector**

In the context of the development of any nuclear program, the UAE would implement the highest standard of regulation and safety management across all aspects of the sector. Safety measures comprise the design characteristics of reactors, including required safety equipment and emergency-response measures, together with numerous regulatory requirements. These measures are intended to prevent accidental radiological releases and to mitigate the consequences of any such release.

From a technical point of view, the UAE believes that the choice of advanced third-generation light water reactors (LWR) would enhance the safety of a prospective nuclear energy program. Reactors of this type offer a number of advancements over second-generation reactors, such as, longer plant life (generally 60 years), enhanced user-friendliness, and higher burn-up rates that reduce fuel use and waste. Most significantly, large improvements have been made with regard to safety, with extremely robust concrete containment structures to protect the reactor and prevent release of radiation to the public in the event of an accident, design simplifications ensuring lower vulnerability to operational disruptions, and ‘passive’ safety systems permitting a reduction in active controls or interventions to avoid accidents in case of a malfunction. As stated above, the UAE believes that the robust

implementation of proven technical rules and standards by the operator, monitored closely by the regulatory authority, would be another critical aspect of ensuring safety. However, as a necessary complement to high-standard rules and regulations, the UAE would ensure that any domestic nuclear power plants are operated by highly skilled and appropriately trained personnel and that emergency preparedness plans are put into place. Also, programs would be established for training and retraining of operations, maintenance, technical support, chemical and radiation protection personnel to enable them to perform their duties safely and efficiently. Moreover, any operator of a nuclear power plant would be expected to conduct self-oversight initiatives. The design of such programs would be for the operator to decide, but might include independent nuclear safety review boards, corrective-action programs such as personnel screening, root-cause identification for problems, and enhanced quality control. In this regard, joint-venture arrangements with foreign partners for the operation of nuclear facilities would be actively pursued.

The UAE would also make extensive use of the operational safety experience gained by the most highly regarded operators of nuclear plants around the world, with a view to achieving similar levels of operational excellence. In addition to exchange visits and operational reviews on a bilateral basis, the UAE will engage the World Association of Nuclear Operators (WANO) and its members to provide assessments and enter into exchanges of operational experiences and data. Similarly, visits to UAE facilities by the IAEA-initiated Operational Safety Review Team (OSART) would be sought as a means of generating advice, feedback and opportunities for improvement by teams of international experts.

**Tactically – via the establishment of necessary border and facility protections to insulate future nuclear power plants, transportation infrastructure and storage facilities from external threats such as terrorism**

Security measures are intended to prevent attacks against and sabotage of facilities that could result in substantial radiological releases. As a stable and prosperous state, the UAE has exerted every effort to maintain and reinforce security in consideration of both internal and external threats. The UAE Ministry of Interior, in coordination with the General Police Directorates of the various emirates, oversees security across the country. The UAE National Security Council, established in 2006, has responsibility for providing ongoing planning and coordination of different Government departments across the UAE to ensure continued national safety. One recent initiative for the

physical protection of critical facilities is the creation of the Critical National Infrastructure Authority (CNIA) in the Emirate of Abu Dhabi, tasked with the assessment and development of all measures concerning the security of vital installations such as onshore and offshore petroleum facilities, power generation and water desalination plants, gas transportation and distribution networks, airports and seaports.

Within the larger framework of ensuring peace and stability on the national territory as described, the UAE is conscious of the critical, and specific, importance of protecting any eventual nuclear activities and installations against internal and external threats.

Therefore, in accordance with the requirements of the relevant international obligations, as well as with its own high internal security standards, the UAE would continue to enhance its security infrastructure to accompany any nuclear power program from inception to commercial operation of facilities and beyond. One integral part of the overall physical protection infrastructure would be the creation of a program to ensure the reliability of operating personnel, involving for example background checks and the issuing of security clearances for access to facilities. In designing the overall physical protection system, the UAE would apply best international practices and take into account the category and location of nuclear material; the need to consider possible radiological consequences when establishing physical protection requirements against sabotage; and whether there is a credible threat of the malevolent dispersal of nuclear material. In order to assess the overall security needs pertaining to nuclear power, the UAE will seek the assistance of the IAEA, via its provision of international Nuclear Security Advisory Services missions, as well as from national governments with recognized capabilities in this area.

#### 4. The UAE Will Work Directly With The IAEA And Conform With Its Standards In Evaluating And Potentially Establishing A Peaceful Nuclear Energy Program

The UAE intends to approach the IAEA as the first international point of contact in the context of its evaluation of a potential nuclear energy program. In fact, the strategies and actions outlined in this document pertaining to operational transparency, non-proliferation and safety are based on IAEA standards and best practices. The UAE has also taken into consideration and intends to be guided by the planning recommendations expressed by the IAEA in its *Milestones in the Development of a National Infrastructure for Nuclear Power publication*

Moreover, as an IAEA member, and having signed the IAEA Revised Supplementary Agreement Concerning the Provision of Technical Assistance by the IAEA in 1989, the UAE would make liberal use of IAEA technical assistance in the areas of safeguards, physical protection, and safety as well as for assessments of potential technology options and appropriate managerial approaches. Outside the scope of specific technical cooperation assistance requested by the UAE, it would be the intention of the UAE to seek IAEA peer review on a continual basis with respect to the establishment of a legal framework, the creation of an eventual nuclear regulatory authority, and other areas of need.

Finally, the UAE will support the development of "Common User Considerations by Developing Countries for Future Nuclear Plants" (CUC) taking place under the IAEA International Project on Innovative Nuclear Reactors and Fuel Cycles (INPRO). The CUC aims to define the common characteristics needed by potential users of new nuclear power plants in developing countries. The user requirements so far identified by the CUC as important, e.g., minimization of NPP project risk, proven technology, reliable operation without unplanned interruption through the entire life cycle, a progressive increase in national participation, and improvement of national capabilities through technology transfer, would be consistent with the interests of the UAE should a decision be taken to proceed with the development of nuclear power.

#### 5. The UAE Hopes To Develop Any Peaceful Domestic Nuclear Power Capability In Partnership With The Governments And Firms Of Friendly And Responsible Nations As Well As With The Assistance Of Appropriate Expert Organizations

Consistent with its record of successful and sustained partnerships on a variety of major projects in the sectors of infrastructure and industry, the development of any nuclear energy program in the UAE would involve cooperation with the governments and firms of friendly and responsible nations that adhere to the highest standards of safety, security and non-proliferation. The UAE is the only oil producer in the Gulf region to maintain private-sector participation in the oil industry. Today, international oil companies from the United States, Japan, France, Britain and other countries continue to hold combined equity stakes of between 40 and 100 percent in Abu Dhabi's oil concessions. Upon committing to any nuclear energy program, the UAE would continue its approach of selecting international partners on the basis of demonstrated technological know-how, organizational professionalism and transparent business practices.

##### **Enlisting assistance at the Government-to-Government level**

In the context of a possible commitment to a peaceful nuclear energy program, it is evident that the development of such a program will require a set of institutional and technical skills not readily available in the UAE. Therefore, the UAE would rely extensively on assistance at the Government-to-Government level. Such cooperation would be conducted in a structured manner through the establishment of high-level arrangements that would provide a political interface, as well as technical and regulatory cooperation structures.

##### **Creating commercial and investment opportunities at the private-sector level**

Given the intention of the UAE, in the event of a commitment to a nuclear energy program, to source nuclear installations from the international market and use time-tested joint-venture arrangements for their operation, opportunities of considerable scope may arise for investors, engineering and fabrication firms and operators.

Consistent with its policy of maximum openness and cooperation with friendly parties having world-class credentials, and in order to maximize its access to the largest pool of specialized expertise, the UAE would also conduct or facilitate a road-show presentation for use in educating UAE and foreign firms with regard to the commercial opportunities resulting from the design, construction and operation of any nuclear power facility.

Notwithstanding the above, the UAE believes that oversight for nuclear operations remains a national responsibility and obligation even in cases where financial resources and operational arrangements permit the acquisition of expertise and equipment from international sources. Accordingly, the UAE will assume national responsibility for the oversight of all activities, in particular those related to the safety aspects of a nuclear power program irrespective of the mode of operation and ownership or degree of reliance on external assistance.

**Requesting assistance and technical cooperation from appropriate expert organizations and participating in technology communities**

In addition, the implementation of any peaceful nuclear energy program in the UAE would leverage the expertise of appropriate expert bodies as well as that of any technology-based communities. The UAE would engage the World Association of Nuclear Operators (WANO) and its members to provide assessments and shared-experience ‘feedback’ through exchange of operating-experience reports, peer reviews, and professional and technical development data. Moreover, the UAE would participate on a reciprocal basis in any community arrangement between countries having common reactor designs and sharing similar technologies in the nuclear field.

**Continued support for Gulf Cooperation Council-based studies and initiatives**

Consistent with its standing as an active participant in the Gulf Cooperation Council (GCC), the UAE would continue to participate in and lend its support to ongoing studies and initiatives on the peaceful use of nuclear energy taking place within the framework of the GCC.

The UAE will also support the adoption of principles similar to those outlined within this document as part of the collective GCC-IAEA initiatives in keeping with its aspiration that any UAE nuclear energy program, established and governed throughout its entire life by the highest international standards and policies, would serve as a new model via which non-nuclear states may in the future explore and potentially deploy nuclear energy with the full support of the international community.

## 6. The UAE Would Approach Any Peaceful Domestic Nuclear Power Program In A Manner That Best Ensures Long-term Sustainability

Given the scope, complexity and resources involved in any commitment to nuclear energy, were the UAE to embark upon such a program it would dedicate sufficient planning efforts and resources, attempting to achieve economies of scale that would ensure the sustainability and continued safe operation of the nuclear energy program. A materially-sized nuclear energy program could contribute substantially and competitively to the UAE's basic power needs for decades, retain the continued support of international investment partners, yield sufficient revenues to support a competent and fully-professionalized regulatory and safety authority and ensure the continual improvement of safety practices and security in accordance with best global standards.

### **Designing a detailed and phased implementation plan**

In order to translate the statement of UAE policy into practical arrangements, a detailed implementation plan will be designed covering all aspects of the UAE's evaluation and potential development of nuclear energy. In the drafting of this nuclear energy master-plan, the UAE will utilize the expertise of recognized international experts.

### **Proactive and coordinated planning for grid expansion and upgrades**

The deployment of modern commercial nuclear reactors is often accompanied by a need to address specific integration requirements such as additional transmission lines, interconnect equipment and spinning reserve. Accordingly, should the UAE commit to any nuclear energy program, transmission authorities would be engaged in proactive planning and timely implementation of grid expansion, and reinforcement and updating to ensure that transmission system limitations, compatibility issues and eventual chokepoints are addressed in a timely manner.

### **Funding of waste and decommissioning liabilities**

The experience of other countries has shown that the creation of a dedicated fund is a highly effective means of funding decommissioning costs. Such a fund could be structured in a flexible manner and could draw on a number of sources for contributions, including income from operations, a levy on electricity tariffs, subsidies from Government and interest or profits from the operation of the fund. Should the UAE commission nuclear power plants within its borders, it would adopt a system utilizing one or more of the above elements to ensure that facilities were fully decommissioned at the end of their useful life.

### **Development and funding of human resource capabilities**

Experiences of other countries implementing nuclear power programs indicate that continued education and training constitute a cornerstone of the critical infrastructure necessary to sustain a nuclear power program. Aware of this condition, and consistent with the high importance placed on the development of its human resources, any undertaking by the UAE to develop a nuclear power program would be accompanied by a strategy to strengthen human resources to meet future staffing requirements. Such an undertaking would involve steps to develop sufficient resources to regulate, manage, operate, and maintain the safety of nuclear facilities. The development of a skilled cadre of nuclear engineers, technicians and regulatory personnel would involve leveraging any opportunities provided by bilateral cooperation partners to attend comprehensive, high-quality nuclear technology programs and making maximum use of training available through the IAEA.

In terms of the sequencing of human resource development programs, the UAE would follow the IAEA recommendation expressed in its Milestones in the Development of a National Infrastructure for Nuclear Power publication that the expertise necessary to guide each project phase be established ahead of time. Accordingly, the UAE would intend to ensure that substantial progress had been made in the development of human resource capacity in advance of facility construction and operation, and would set aside a dedicated budget in the initial stages for that purpose. In the longer term, mindful of ensuring continuous development of overall human resources, the UAE would also create a dedicated mechanism (similar in structure to the fund used for decommissioning and waste disposal) to fund ongoing human resource development programs, including training and retraining of operators, inspectors and regulators.



**Conclusion** – These six above principles describe policies and strategies that the UAE will pursue as it continues to evaluate the potential use of nuclear energy in meeting growing power demand, as well as actions that the Government of the UAE would undertake should it chose to move forward in establishing an actual nuclear energy program.

It is the belief of the UAE Government that these policies, strategies and actions would set a new standard for operational transparency, safety and non-proliferation and definitively demonstrate the UAE's peaceful intentions in exploring the application of nuclear power within the UAE