



United Arab Emirates



# United Arab Emirates (UAE) Nuclear Program Update

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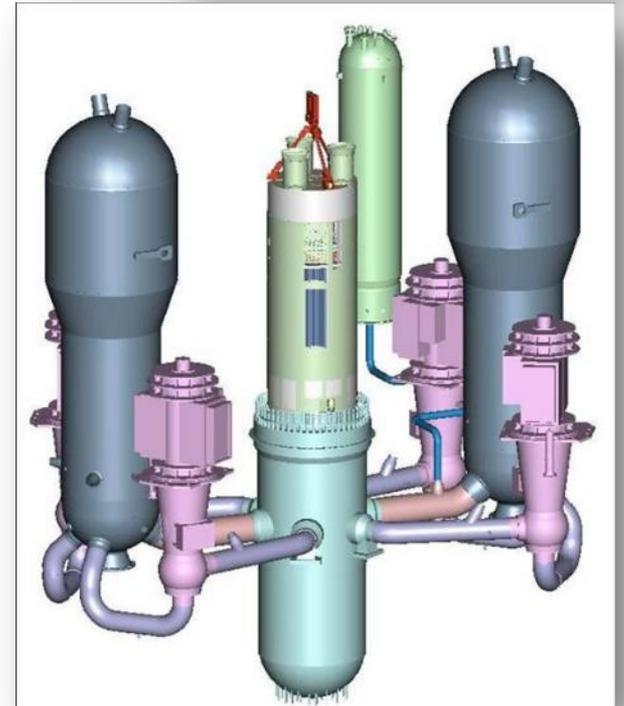
Wednesday, January 10<sup>th</sup>, 2018

Ft Lauderdale



# Outline

- ⊗ The United Arab Emirates (UAE)
- ⊗ Federal Authority of Nuclear Regulation (FANR)
- ⊗ APR1400 Reactor
- ⊗ Status of Licensing
- ⊗ Photos, past and near current
- ⊗ RP related REGs
- ⊗ FANR Infrastructure
- ⊗ Status of Licensing
- ⊗ Radiation Protection at Barakah NPP





# United Arab Emirates (UAE)

The United Arab Emirates is a constitutional federation of seven emirates, formed in 1971:

- Abu Dhabi,
  - Dubai,
  - Sharjah,
  - Ajman,
  - Umm al-Qaiwain,
  - Ras al-Khaimah
  - and Fujairah
- UAE lies along the south-eastern tip of the Arabian peninsula. Occupying an area of about 83,600 sq. km





# UAE Before and After

**1958**



Source: [www.thenational.ae](http://www.thenational.ae)

**Present**



Source: [www.thenational.ae](http://www.thenational.ae)



United Arab Emirates



## UAE Nuclear Programme





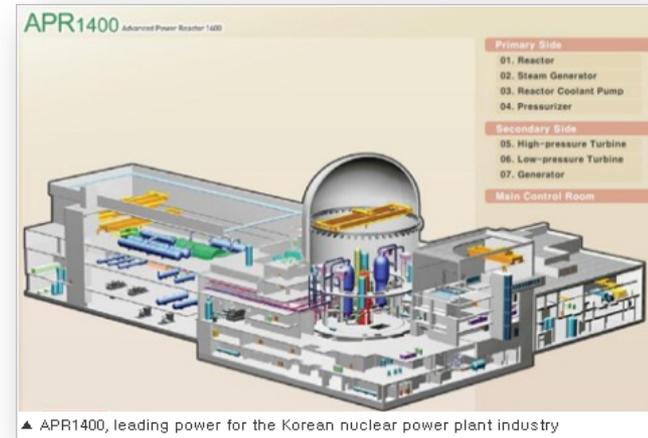
# Issuance of Nuclear Law

In line with the UAE Policy & international treaties, the Federal Law by Decree No (6) of 2009, Concerning The Peaceful Uses of Nuclear Energy (the “Nuclear Law”) was issued by the President in September 2009 to:

- ⊗ develop & control UAE nuclear sector towards peaceful purposes
- ⊗ ensure Nuclear Safety & Security, and Radiation Protection
- ⊗ prohibit Enrichment & Reprocessing Facilities in UAE



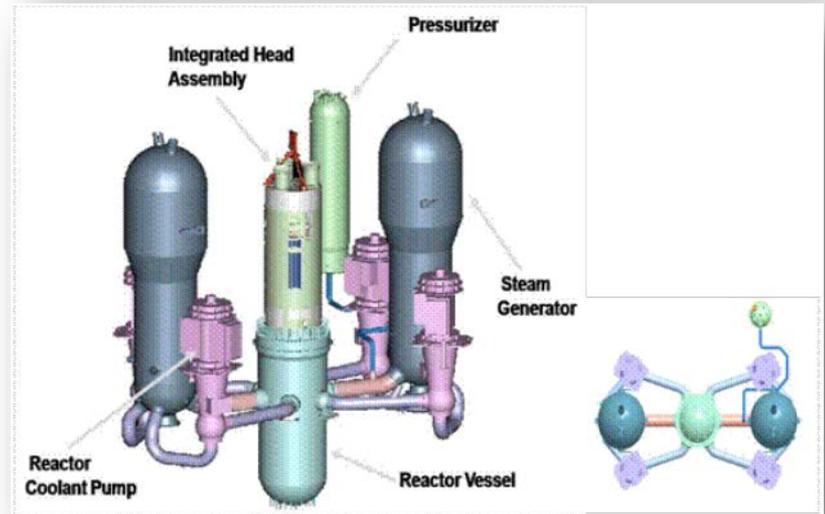
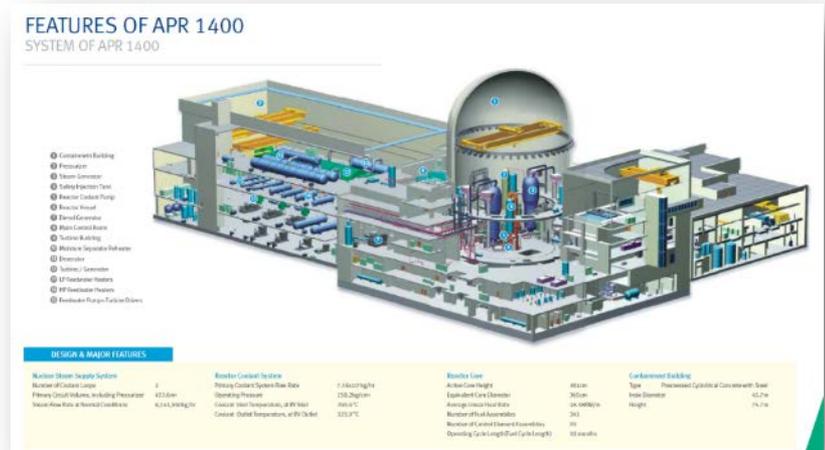
## Barakah Nuclear Power Plants (BNPP) Korean APR1400





# Barakah APR1400 Basic Features

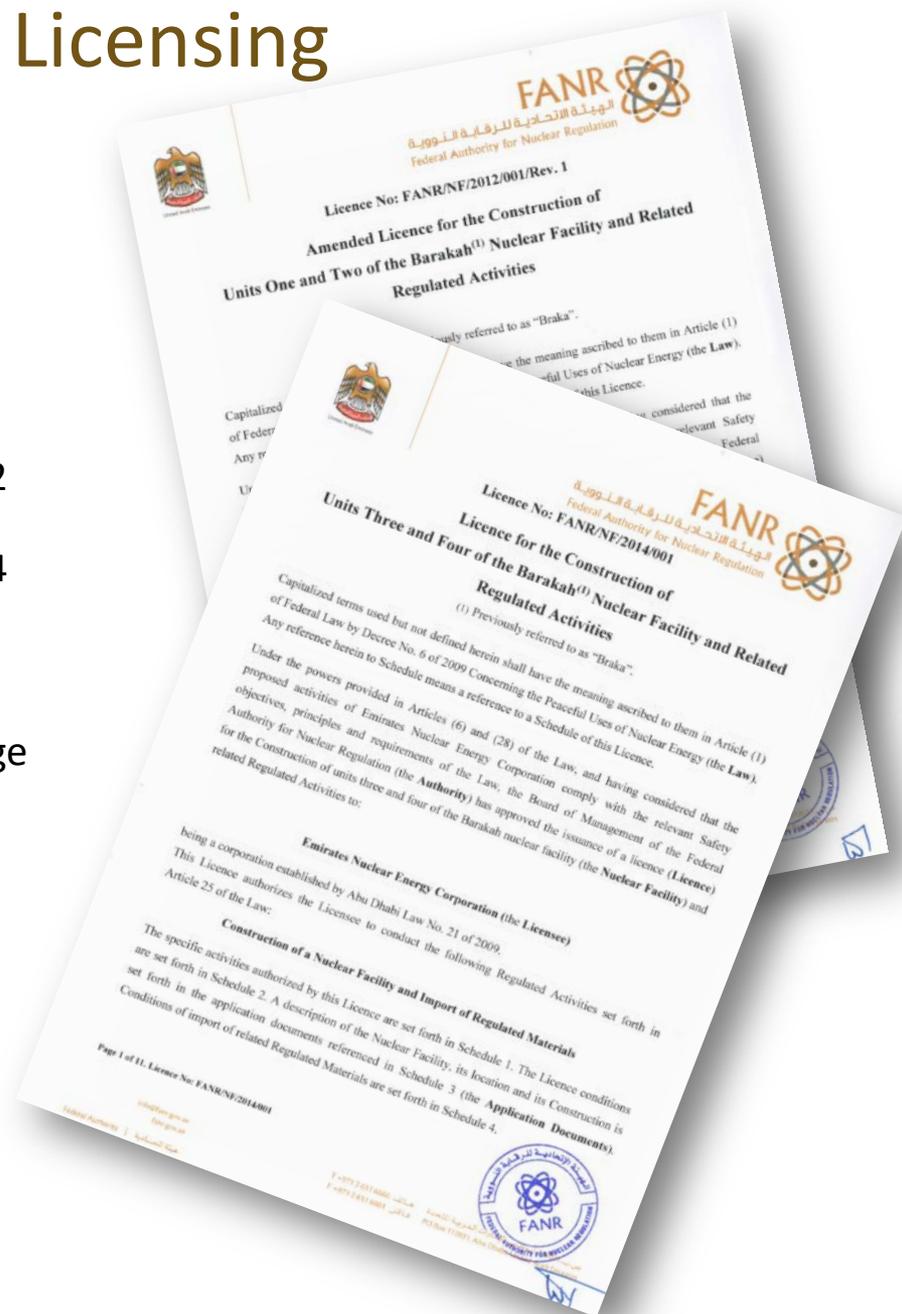
- Core diameter: 364 cm
- # fuel assemblies: 241
- Fuel type: 16 x16, PLUS7
- Thermal power: 3,983 MWt
- Electrical power: 1,390 MWe
- Steam generators: 2
- Coolant pumps: 4
  
- Fukushima lessons learned incorporated into Barakah Design





# Current Status of Facility Licensing

- FANR licenses issued to Emirates Nuclear Energy Corporation (ENEC) and latterly Nawah:
  - Site Selection Licence (2010)
  - Site Preparation Licence (2010)
  - Limited Construction Licence (2010)
  - Construction Licence for Barakah Units 1 & 2 (July 2012)
  - Construction Licence for Barakah Units 3 & 4 (September 2014)
  - FANR Approved transport package for fresh fuel [per TS-R-1]
  - Provided license for receipt, handling, storage of unirradiated fuel
  - Currently performing OR Inspections:
    - Constructed in accordance with requirements
    - Training programs
    - Operational programs/processes
    - Integrated Demonstration of Operational Readiness
  - Anticipated license to Operate Unit 1 2018, other units each year after:
    - SER near completion
    - RAIs and open inspection findings being closed





# Google Earth Image of the Site (~early 2014)





# Google Earth Image of the Site (~early 2014)

Concrete  
Batch  
plant and  
Lab

Warehouses

Units 3  
and 4

Units 1  
and 2

Construction  
workers  
village

Currently  
~ 20,000  
workers



Abu Dhabi  
(~220km)



# Google Earth Image of the Site (recent)



# Units 1 and 2 Early Photos



All images from Google image search



# Units 1 and 2 Early Photos



All images from Google image search



# Units 1 and 2 Early Photos



All images from Google image search



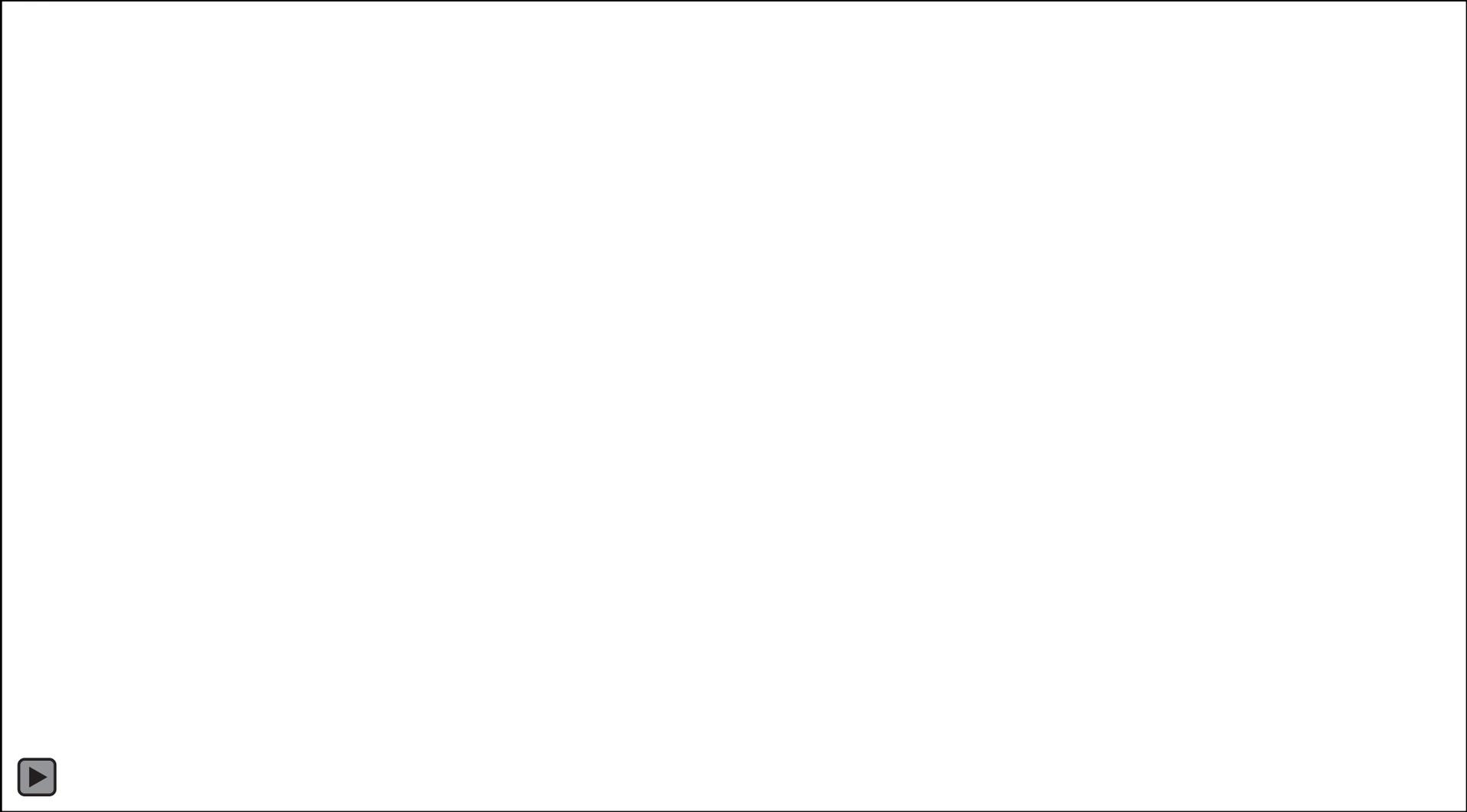
# Units 1 and 2 Early Photos

- Completion of the construction of the concrete dome for the Unit One Reactor Containment Building





## Recent Video





# Units 1 and 2 Recent Photos





# Units 1 and 2 Recent Photos





# Latest Images

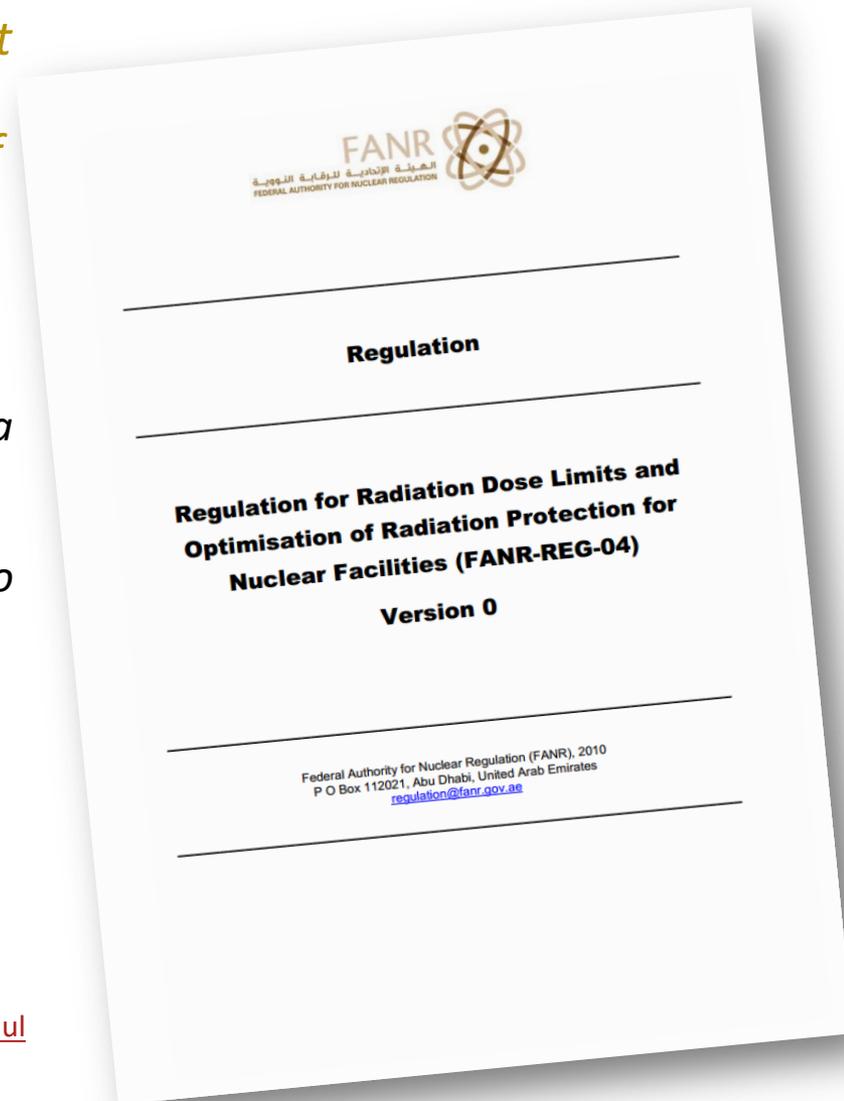




# Key FANR Regulations relating to Radiation Protection and ALARA

- FANR-REG-01 *'Regulation for Management Systems for Nuclear Facilities'*
- FANR-REG-03 *'Regulation for the Design of Nuclear Power Plants'*
- FANR-REG-04 *'Regulation for Radiation Dose Limits and Optimisation of Radiation Protection for Nuclear Facilities'*
  - 20 mSv/yr, averaged over 5 years (50 mSv in a single year) – workers
  - 1 mSv/year – public
  - Establish dose constraint lower than above, to be approved by FANR
- FANR-REG-06 *'Regulation for an Application for a Licence to Construct a Nuclear Facility'*
- FANR-REG-11 *'Regulation for Radiation Protection and Predisposal Radioactive Waste Management in Nuclear Facilities'*

All Regs and Reg Guides @  
<http://www.fanr.gov.ae/En/RulesRegulations/RegulationsGuides/Pages/default.aspx> (in English and Arabic)





## Recent Updates (RP Related)

- Fuel Shipping Cask Fabrication Inspection (ROK)
- Fuel Packing Inspection in ROK (KNF)
  - Visual inspection, accelerometers, surveys, shipping docs, FME, etc.
- Received Fuel in U1 (1.25 cores worth)
  - Stored in new fuel racks and in SFP (dry)
- Performed RP readiness inspection prior to FOS (limited RPP scope)
- RP inspection after FOS
- EP Inspection (TSC, OSC, Simulator, EOF, EOC)
- Full Scale Emergency Exercise (Oct 2017) – 2<sup>nd</sup> one
- Training Inspections, inc. RP (Systematic Approach to Training)
- RP Programs Inspection (programs, processes, implementing procedures)
- RP Equipment Inspection (portable and installed, Inc. effluent monitors, TLD readers, whole body counters)
- FANR Inspection summaries can be seen:  
<https://www.fanr.gov.ae/en/open-data/inspection-reports>



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Thank you