

5th MDEP Conference

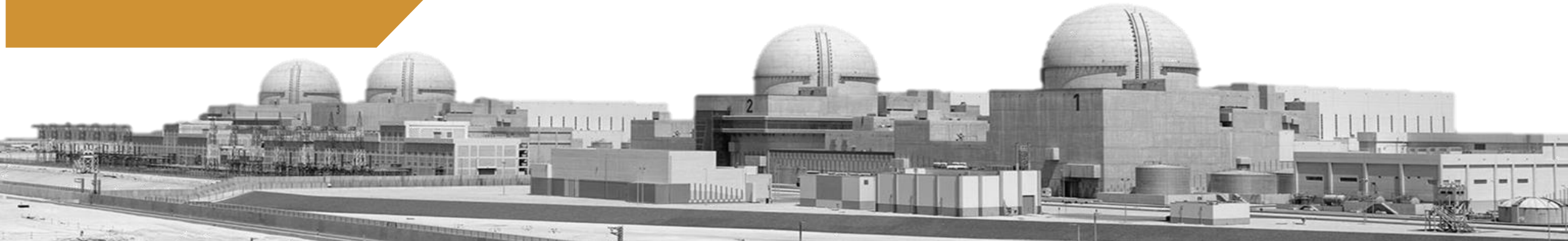
International Cooperation, Past, Present
and Future

Session 4 – Considerations for Expanding International Cooperation

PERSPECTIVE ON EXPERIENCE SETTING UP NEW NUCLEAR ENERGY PROGRAMMES

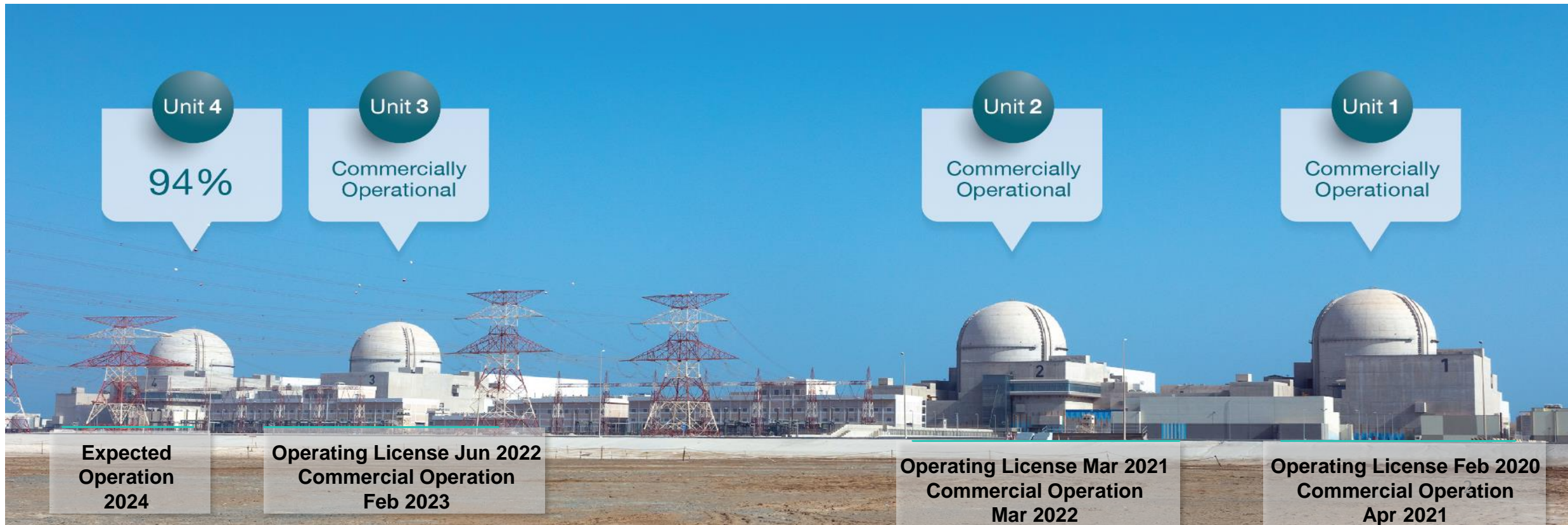
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BARAKAH NUCLEAR POWER PLANT STATUS As of APRIL 2023



FROM THE START



1



FANR new nuclear regulatory body – license applicant new as well

2

The **Nuclear Law** establishing FANR was issued in September 2009



3

The **license application of construction of 2 reactors** was submitted in December 2010



4

The application concerned a reactor design that had been recently licensed by a foreign regulatory body, and the design to be built in UAE was similar but differences were introduced.

1



Use of “Country of Origin (CoO)”
And unique licensing process

2



Use of “Technical Support Organizations (TSOs)”

3



Use of strong “Project Management”

4



IAEA Support / International WGs and strong cooperation with regulators

5



Unique Capacity Building

6



International Advisory Board (IAB)

LICENSING STRATEGY

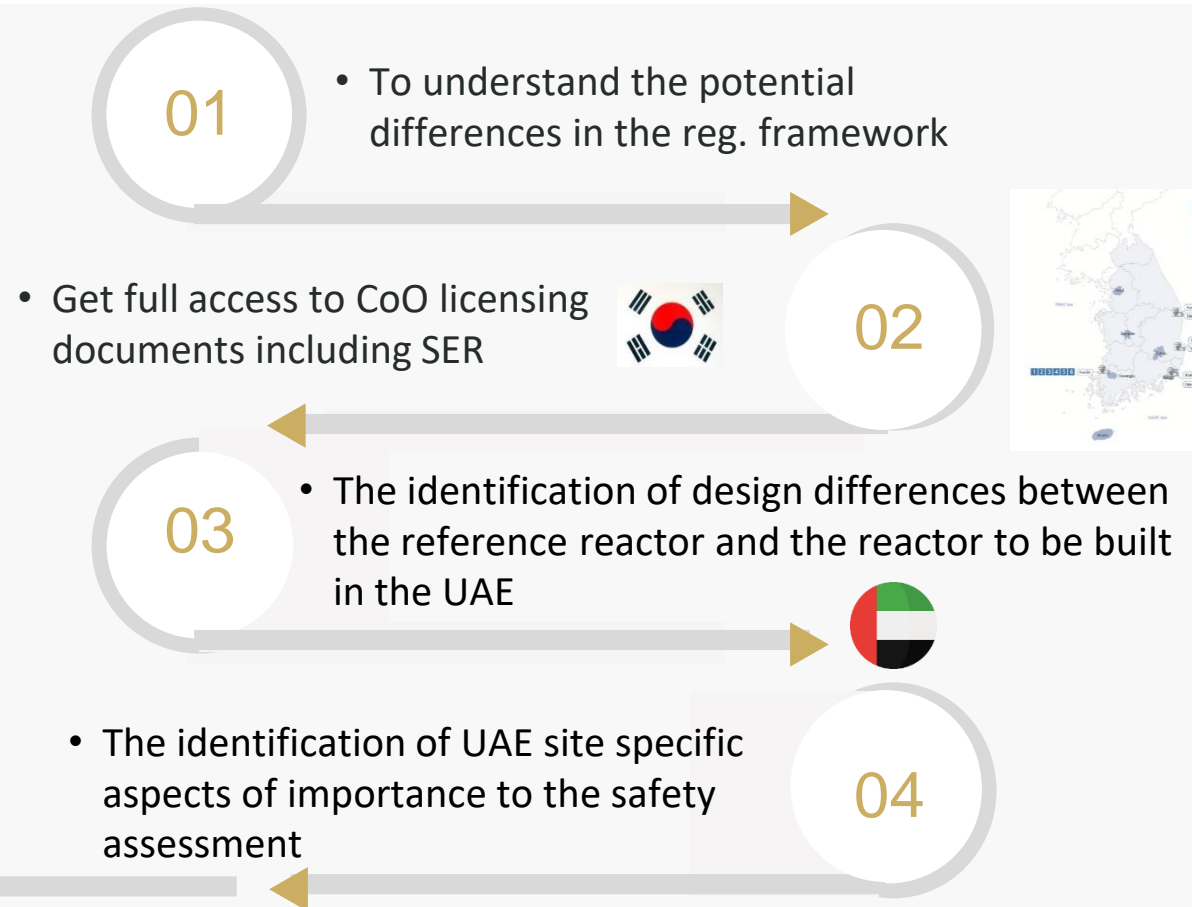
2-step licensing process agreed on,
Construction Licence and Operating Licence

Regulations by FANR were conforming to IAEA
safety standards and security guidance –
focusing on performance of the licensee

FANR decided to leverage in a systematic manner
the work done by **the CoO regulator**, and to
use experienced external TSOs in the safety
review and assessment work.

- And consideration to pay attention to other important safety issues

Important for FANR was the following:



LICENSING REVIEW STRATEGY

Development of detailed instructions to the reviewers, including external TSO and FANR staff. The overall instruction was finalized in Nov 2010 called “Grading and Benefitting from the CoO Regulatory Reviews”. In the instruction to the reviewers it was pointed out the need to:

1

Focus on most risk-significant areas.

2

Leverage work done by CoO regulatory body.

3

To follow the Formal Arrangements with CoO Regulator.

4

To work with CoO Regulator to understand the CoO reg. framework, the safety objectives and requirements, and get familiar with the extent and depth of the CoO safety assessment including the technical basis of it.

5

Grade the over 200 review items in two categories, Cat 1 and Cat 2 according to specific criteria in advance to estimate the resource demands. Changes could be done later.

- TSO experts coming from US and Europe, depending on their expertise were given them different review areas covering the entire PSAR.

REVIEW METHODOLOGY

A Category 1 Review is assigned to any item of the PSAR that meets any one of the following criteria

- This is an **area of new technology** with significant impact on nuclear safety.
- Since acceptance of the plant design by the RBCoO, there have been new findings (for example, from operating experience or research) with significant implications on nuclear safety.
- SSCs or operational activities associated with this item contribute significantly to the facility's overall risk as indicated, for example, from the results of probabilistic analyses.
- Other conditions (e.g. environmental, external hazards, AC voltage frequency) associated with this item are specific to the UAE.

A Category 2 Review is assigned to any item of the SAR that meets all of the following criteria:

- The documentation submitted by the applicant is adequate to the extent that the reviewer has **sufficient information to assess the information**.
- The submission demonstrates that the **RBCoO's regulatory requirements** associated with this item are consistent with and **meet those of FANR requirements**.
- The **technical basis used by the RBCoO** to perform their review and assessment is **clearly described** and explained.
- With respect to the reference plant **there is no design change** with significant impact on nuclear safety.
- With respect to the reference plant there is **no change in operational activities** with significant impact on nuclear safety.

EXAMPLE OF DESIGN CHANGES in UAE NPP

- Particular safety demonstrations of those and other site specific aspects, heat loads, flooding, etc and also on severe accident mitigation were needed. Use of TSO of particular importance to get experienced reviewers contributing to our work.

For example: Core melt accident mitigation (where there were some design changes, such as composition of concrete below reactor vessel). FANR did confirmatory calculations on base mat melting, pressure build up,and on containment leak tightness.

1

- Sea by pass design to ensure the delta of discharge is less than 5 degrees. Change of seawater temperature from 28.5 to 38.5 degrees

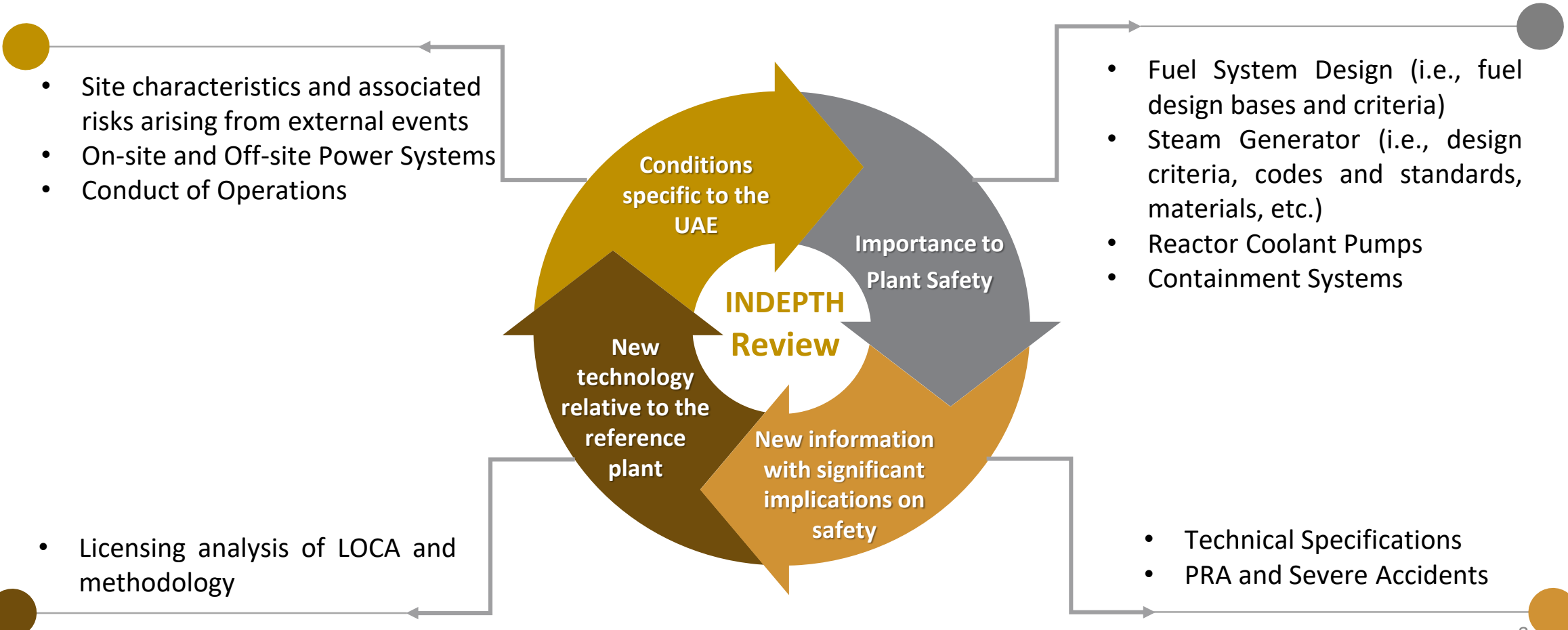
2

- Most heat exchangers are changed and condenser design to stay with certain limits. Also change of electrical frequency from 60 to 50 Hz. Pumps modified, Chillers and fans capacity enhanced, etc

3

- Add to this changes resulting from the Fukushima experience

IN DEPTH REVIEW CONDUCTED BY FANR



MPDEP VALUE TO UAE NPP LICENSING PROCESS

1

FANR participated in the MDEP APR1400 Working Group between 2012 and 2021 together with Koarea NSSC/KINS and the USNRC.

2

From the FANR perspective, MDEP has been a good example of how regulatory cooperation can benefit all participating regulators.

3

Such efforts through MDEP improved the regulatory efficiency of FANR licensing review, recognizing that there were some differences in the regulatory requirements among the members, hence actually helping with agility.

4

MDEP outcomes supported FANR's regulatory decision & basis and aided in the regulatory review of certain issues (e.g., severe accidents).

It was a good way for FANR of leveraging information of other regulators' reviews in FANR's licensing review for UAE Barakah NPP.

UAE/FANR-ROK "NSSC/KINS" Cooperation

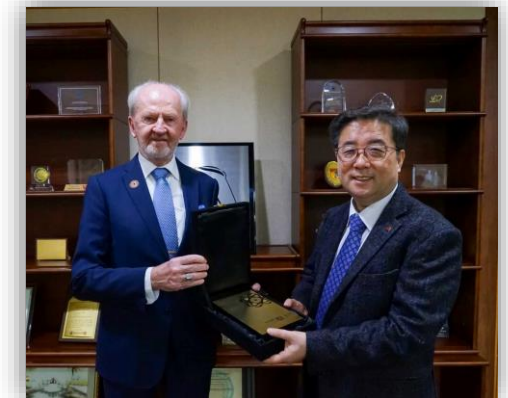
1 Strong formal cooperation agreement with CoO Reg, MoUs, Agreements, & Secondments

2 Close interaction between FANR and CoO Reg experts, frequent technical meetings, monthly technical operating experience reports (OPEX)

3 Understanding of the reg. framework of the CoO and its safety objectives

4 Access to detailed licensing information, also information classified by CoO

**Supported
Licensing and
Regulatory
Oversight
Activities**

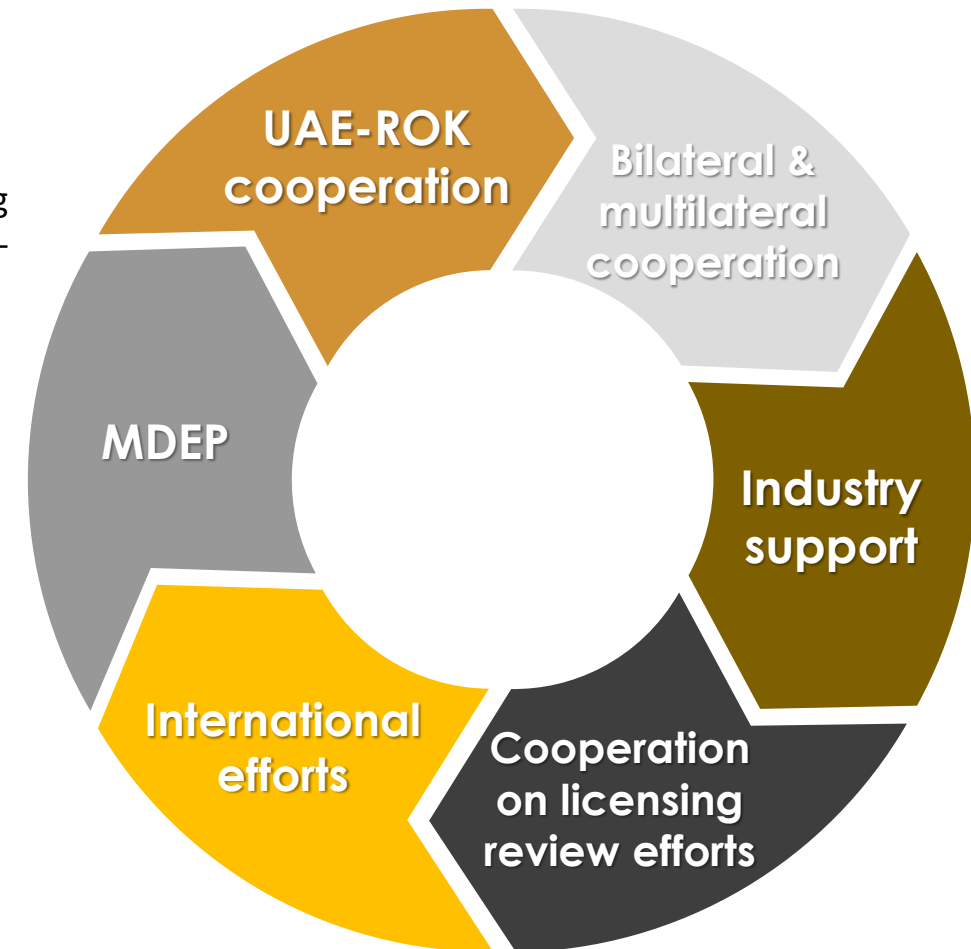


“Conclusions”



Considerations for Expanding International Cooperation

- **MDEP demonstrated that multinational cooperation is beneficial** for regulators in countries interested in a similar reactor design.
- The **MDEP lessons learned and methodology should be carried forward** to regulators in embarking and expanding countries.
- The **UAE-ROK cooperation in licensing in the UAE of the APR1400** is a concrete example on how a new regulator can leverage the resources of a regulator that already licensing a similar design.
- **UAE-ROK cooperation will continue** in exchange of technical information of regulatory oversight of operating plants.
- **Bilateral and multilateral cooperation efforts** are on-going presently, i.e. USNRC-CSNC, ASK-STUK-SUBJ, ..
- **“SPIN OFF”** cooperation on MDEP licensing review efforts to the operating phase, FANR-KINS, EPR WG, ...
- **Industry support to regulators** willing to work together to review a certain design that are being developed by a vendor is a further effort to streamline licensing.
- The **IAEA effort** such as SMR Working Group and the NHSI should further support harmonization of licensing approaches among regulators and industry.
- The **NEA efforts** on SMR and converting former MDEP groups into CNRA work commendable.



THANK YOU

