



Expanding into Research Opportunities: Gulf Nuclear Energy Infrastructure Institute (GNEII) in Year 5

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Introduction & Background

Foundational Pillars

Research: Origins & Growth

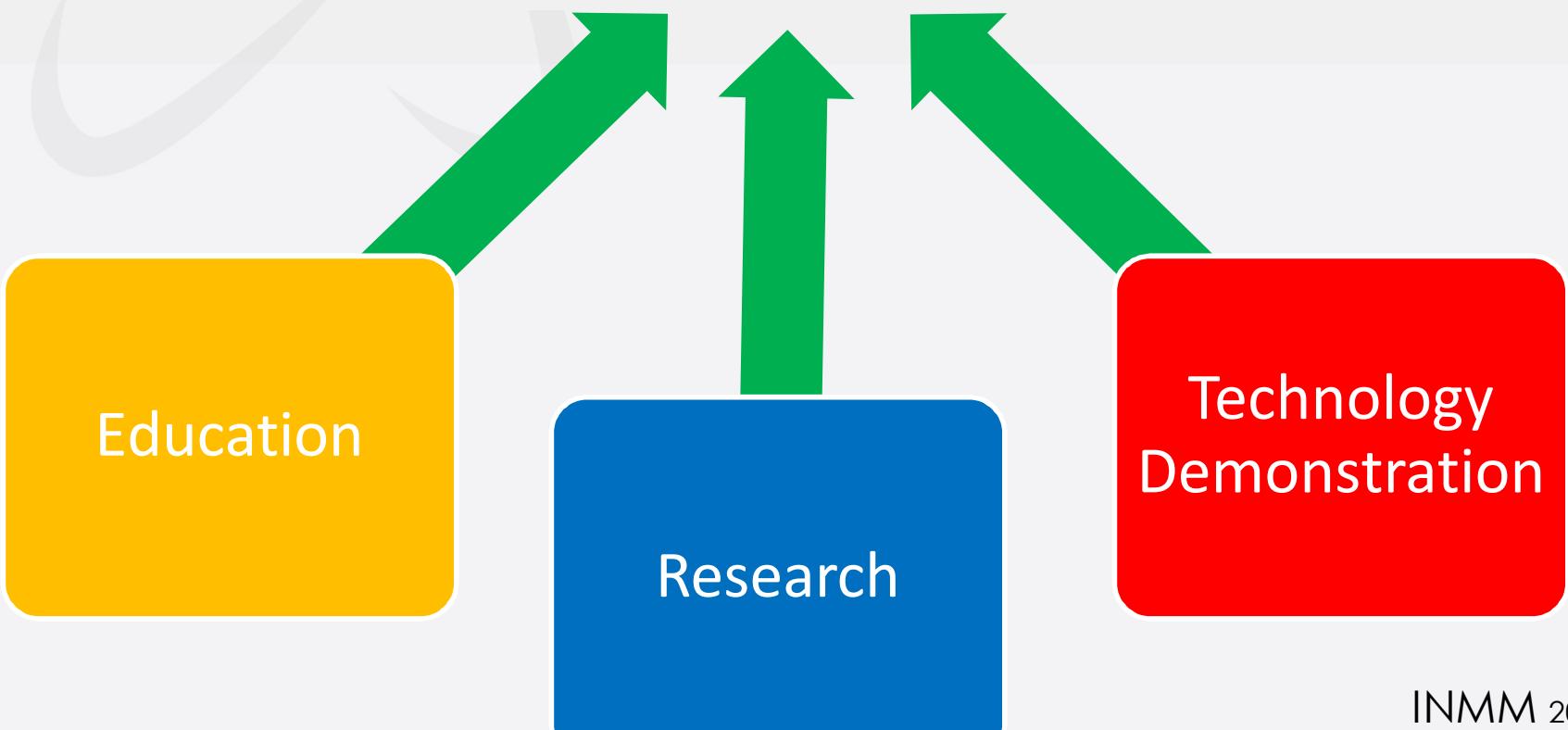
Transition & Sustainability

Summary

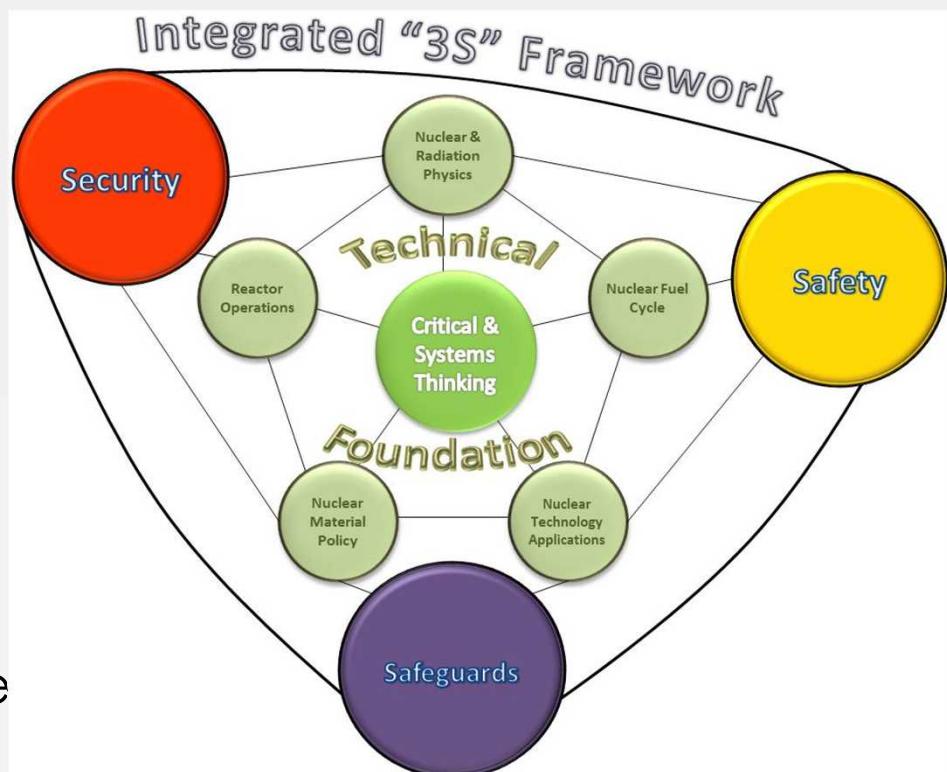
- GNEII is:
 - A Gulf/Middle east regional human resource development capability
 - Hosted at Khalifa University, Abu Dhabi, UAE
 - A strategic partnership
 - Between UAE (Khalifa, CICPA, ENEC, FANR) & U.S. (SNL, TAMU, DOE/NNSA, DOS/PNS) stakeholders
 - An educational & research entity
 - Beyond traditional training courses
 - A leader in '3S' & emergent nuclear energy infrastructure knowledge

- GNEII's Mission:
 - to develop a responsible nuclear energy culture and institutionalize key safety, safeguards, security, and nonproliferation norms in the future decision-makers of Gulf-region nuclear energy programs through professional development
- GNEII's Vision:
 - provide the Gulf, and surrounding region, with a continual source of indigenous nuclear energy professionals with whom the global community can effectively collaborate to achieve broader nuclear energy security, safeguards and safety priorities
- Established in 2011, 5 years of operation

Foundational Pillars (1/3)



- Pillar #1: **Education**
 - Fundamentals Course
 - Depth & breadth in novel curriculum
 - Topics include:
 - Wk#1: Critical & Systems Thinking; & Intro to 3S
 - Wk#2: Nuclear & Reactor Physics
 - WK#3: Nuclear Power Plant Operations & Systems
 - WK #4: Nuclear Fuel Cycle & Nonproliferation Policy
 - WK#5-#6: Nuclear Safeguards
 - WK#8-#9: Nuclear Security
 - WK#10-#11: Nuclear Safety
 - WK#7, #12-#14: Capstone



- Pillar #II:
Technology Demonstration
 - Leverage Khalifa University Nuclear Engineering Department Capabilities
 - Provides opportunities for:
 - Practical exercises
 - Hands-on instruction
 - Real-life scenario simulations



Origins & Growth

Research Areas

Integrated 3S
Methodologies

Nuclear
Infrastructure
Development

Gulf/Middle East
Regional
Nuclear
Interactions

Research Methodology

Fundamentals
Capstone

Joint Research

Collaboration
within Khalifa
University

Research Goal

Provide the Gulf - and surrounding region - an avenue through which the global nuclear community can effectively collaborate to achieve broader nuclear energy safety, security and safeguards priorities

Research (3/3)

| | |
|------|--|
| 2011 | Integration of Nuclear Safety, Security & Safeguards |
| | Effects of the Environmental on Nuclear Power Plant Operations |
| 2012 | SBO Roles and Mitigation Plan |
| | The UAE Export Control Laws |
| | Project Control of NPP Construction |
| | Impact of NPP/Desalination on Gulf |
| | MIMIS on APR1400 Reactor |
| | APR1400 Liquid Source Terms |
| | UAE Strategy for HLW Management |
| | Transportation of Fresh Nuclear Fuel |
| | Radioactive Dose Pathway Modeling |
| | Transparency in Nuclear Security |
| 2013 | Emergency Preparedness for NPP |
| | Pyrochemical Reprocessing |
| | A Qualitative Assessment of Fuel Fabrication Options in the UAE |
| | The Suitable Mobile Lab for the UAE Condition |
| | Emergency Preparedness Plan for Radioactive Material |
| | Safety, Security, and Safeguards Challenges for Building a Final Repository for Spent Fuel in the UAE |
| | Use of Microfinned Steam Generator Tubes in NPP |
| | The Role of Management Systems in Protecting the Environment from RNEP |
| | Filling the Gaps Between Safety and Security |
| | Emergency Preparedness Plan |
| 2014 | Survey of the Current Spent Nuclear Fuel Storage Technologies & Assessing Safety Approaches of Existing Systems for Barakah Nuclear Power Plant (BNPP) |
| | Development of Recommendations for the Nuclear Security Culture in the UAE |
| | Evaluation of Security and Safeguards Measures for the Transportation Security in the UAE |
| | Evaluation of Safeguards and Security Options for the Dry Cask Storage in the UAE |
| | Synergy between Safeguards and Security at an NPP |
| | An Initial Radiation Baseline Study of Urban Environment in Abu Dhabi |
| | Effective Enhancements for Integrated Safety and Security Control Systems in BNPP |
| | Thermal-hydraulic Studies on Design Extension Condition of Prolong Station Black Out with Additional Failures |
| 2015 | Overview of Molten Core – Concrete Interaction (MCCI) and Mitigation Actions |
| | Needs of Atmospheric Dispersion Models in Emergency Situations |
| | Investigation on the Sensitivity of UAE Domestic Agricultural Production to Radiological Contamination Following a Hypothetical Severe Nuclear Accident at Barakah NPP |
| | Evaluation of Threats by Drones to a Nuclear Power Plant |
| | Evaluation UAE Security Culture – Insider Threat |
| | Operational Security and Information Protection in the Areas of 3S |

Current Efforts

- Primary emphasis on Capstone Projects
 - Opportunity to apply the novel education to a real problem
 - Some submitted, accepted to professional conferences

Categorization & Future

- 5 years of Capstone Projects, good representation across GNEII's Research Framework
- GNEII Visiting Research Fellow in place & performing research (partly influenced by 2015 Capstone Project)
- Goal: regional voices on nuclear matters shared with global nuclear energy community

| Core Competency Research Area | 2011 | 2012 | 2013 | 2014 | 2015 |
|--|------|------|------|------|------|
| Integrated 3S methodologies | 1 | 1 | 4 | 4 | 2 |
| Nuclear infrastructure development | 0 | 6 | 4 | 4 | 4 |
| Gulf/Middle East regional nuclear interactions | 1 | 4 | 3 | 1 | 4 |

- 3 pillars expanding as part of strategic plan for GNEII
- From the outset, goal has been for GNEII to be self-sufficient
 - MOUs codifies transition from U.S. to UAE implementer set for 2017
 - 1st MOU = agreement to establish GNEII
- Follow-on MOU in negotiation based on peer-to-peer collaboration between GNEII and its original implementers

- GNEII's strong research pillar → sustainability
- Research = path for regional voices to be heard globally
- Research = backbone for future collaborations

| Year | # UAE Fellows | | | # Non-UAE Fellows | Yearly Total | Countries Represented |
|--------------|---------------|-----------|-----------|-------------------|----------------------|--|
| | ENEC | FANR | CICPA | | | |
| 2011 | 4 | 5 | 1 | 0 | 10 | UAE |
| 2012 | 3 | 9 | 2 | 8 | 18 (22) ⁱ | UAE, Kuwait, Saudi Arabia, Qatar, Jordan |
| 2013 | 4 | 6 | 3 | 7 | 20 | UAE, Saudi Arabia, Qatar |
| 2014 | 6 | 3 | 3 | 0 | 12 | UAE |
| 2015 | 7 | 4 | 5 | 2 | 18 | UAE, Jordan |
| TOTAL | 24 | 27 | 14 | 17 | 78 | 5 |

ⁱDue to modular structure of the course in 2012 not all international participants were able to finish all required modules because of the travel restrictions.

Thank You

- For more information or to nominate GNEII Fellows, please contact us:
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