The

Gulf Nuclear Energy Infrastructure Institute

A Partnership for Human Resource Development

Wednesday, 17 March 2010

IAEA International Conference on Human Resource Development for Introducing and Expanding Nuclear Power Programmes

Dr. Amir Mohagheghi
Sandia National Laboratories

Dr. David Boyle
Texas A&M University

Dr. Phil Beeley
Khalifa University of Science, Technology and Research
Overview

Gulf Nuclear Energy Infrastructure Institute (GNEII)

- Background
- Concept
- Partnership
- Students & Education Program
- Indigenization Plans & Future Expansion
- Conclusions
Background

Nuclear Security in the Middle East

– Nuclear Energy Programs – Highlights
  • UAE: Early 2009 US/UAE 123 agreement
  • Jordan: Recent peaceful nuclear agreements for NPP in 2013
  • Egypt: June 2009 chooses Australian firm to design NPP
  • Qatar: 2008 MOU with France on nuclear cooperation

– Infrastructure Requirements
  • IAEA ‘Milestones Report’ (NG-G-3.1)
  • Education, human, technical resources to develop responsible nuclear energy program

– Need
  • Indigenous capability for nuclear infrastructure development
GNEII is designed to be

- A regionally based institutional human resource development capability

- A “demand-driven” initiative

- Nuclear energy infrastructure (safety, safeguards & security) for development & education in a regional context

- A source of technical collaboration & scientific excellence between Western & Muslim worlds

- A strategic effort to develop nuclear energy safety and security culture in future program decision-makers

- One piece of a multi-faceted, strategic program to develop human infrastructure for nuclear energy
Concept

GNEII will be an Educational Institute

- **15-25 students per year**
  - Curriculum focused on nuclear safety, security, and safeguards
  - Emphasizes understanding and application of global standards

- **Two 15-week semesters**
  - 1\textsuperscript{st} Semester: Technology and policy fundamentals
  - 2\textsuperscript{nd} Semester: Capstone module, applying knowledge to real-world issues

- **Initial students to come from GCC countries**
  - Goal: expand student candidate pool to meet the needs of wider Middle-East region
Partnership

• United Arab Emirates Partners
  – *Khalifa University of Science, Technology and Research (KUSTAR)*
  – *With support from:*
    • Emirates Nuclear Energy Corporation (ENEC)
    • Federal Authority for Nuclear Regulation (FANR)

• United States Partners
  – *Sandia National Laboratories (SNL)*
  – *Nuclear Security Science & Policy Institute (NSSPI) at Texas A&M University*
Partnership

- **GNEII Management:** *daily institute operations*
  - GNEII local director & supporting institute staff (Emirati)

- **GNEII Implementation:** *business & policy matters*
  - GNEII Steering Committee
    - SNL, NSSPI, KUSTAR, ENEC, FANR representation

- **GNEII Oversight:** *academic & strategic planning*
  - GNEII Advisory Council
    - *May include (but not limited to):* IAEA, WINS, LNCV, DOE/NNSA(NA242), DOS/ISN/CTR, NRC, regional representatives
Students & Education Program

• GNEII’s student population criteria
  – *Entry to mid-level government (or government-affiliated corporation) officials*
  – *Possess at least a bachelor’s degree or equivalent work experience*
  – *Expect to work in a Middle Eastern nuclear energy industry in some capacity*

• Objectives
  – *Long-term: populate decision-making ranks of regional nuclear energy programs with GNEII graduates*
  – *Short-term: identify & select subset of GNEII Students as future lecturers*
Students & Education Program

• Fundamentals Module
  • Systems Thinking
  • Nuclear and Reactor Physics
  • Nuclear Fuel Cycle
  • Nonproliferation Tools/Approaches
  • Power Plant Management and Ops
  • Reactor Safety Systems
  • Radiological Mat'ls Mgmt & Health Physics
  • Export Control and Legal Structures
  • Safeguards, Inspections, and Monitoring
  • Critical Thinking
  • Geopolitical and Historical Factors
  • Laws, Norms, and Regulations
  • Reactor Accident Modeling
  • Probabilistic Risk Assessment
  • Emergency Preparedness & Response
  • Facility Vulnerability Assessment
  • Physical Protection Systems
  • Material Control & Accountability

• Capstone Module
  – Apply knowledge to real-world, regional & substantive projects
  – Students work with faculty mentor & in multi-national groups
  – Must answer both technical and policy questions
Example GNEII Annual Schedule

**GNEII Opening Seminar (October)**
- GNEII Program Overview
- Presentation, regional & international networking, etc.

**Fundamentals Module (Oct, Nov, Dec)**
- Unit 1: Nuclear Energy Prerequisites & Fundamentals
- Unit 2: Nuclear Energy Management & Safety
- Unit 3: Nuclear Energy Safeguards & Security

**Capstone Module (Mar, Apr, May)**
- Month 1: Research proposal, brainstorming, forming & outlining
- Month 2: Research continued (interviews, archive searches, etc)
- Month 3: Research completed, submitted, and symposium preparation

**GNEII Symposium (June)**
- Student presentations, regional & international networking, etc.
Indigenization Plans & Future Expansion

• Multi-pronged plan for GNEII to become self-sustaining after 5 years
  – *Phased approach for select institute students to become lecturers*
  – *Train subset of KUSTAR nuclear engineering program faculty*
  – *Leverage growing UAE relationships within the international nuclear energy community*

• GNEII’s Future Expansion
  – *Additional core & elective courses*
  – *Regional workshops on related topics*
  – *Development of applied research capabilities*
Conclusions

GNEII offers multi-faceted benefits

– Local
  • Enhances UAE’s intellectual/academic standing

– Regional
  • Increases regional understanding of safety, safeguards, security, risks, rewards & responsibilities of nuclear energy expansion

– Global
  • Provides the global community a transportable model of an institute that teaches the technologies, policies & understanding of nuclear energy safety, safeguards & security
 شكراً

Thank you