

Integrated University Programs (IUP) in Support of Nuclear Engineering Education

Yousry Y. Azmy

Chair of NEDHO 2011-12

and

Professor & Head

Department of Nuclear Engineering

North Carolina State University



Why Support Nuclear Eng. Education?

❑ **Economic/energy security:**

- ❖ Nuclear accounts for 20% of US energy supply ⇒ 70% of all non-carbon-emitting energy
- ❖ Competitive cost, reliable operation (90+% capacity factors)
- ❖ Ample & reliable supply of uranium

❑ **Global competitiveness:**

- ❖ The world is building nuclear: \$400B nuclear energy global market
- ❖ US reactor technology must lead the way into the future
- ❖ Many nuclear hopefuls are underdeveloped ⇒ buy US reactors ⇒ jobs

❑ **National Security:**

- ❖ Nuclear proliferation concerns multiply with rising number of nuclear nations
- ❖ Continuing threat of nuclear terrorism

❑ **True product of academic program: highly educated workforce aware of national needs & able to tackle them**



What is IUP?

- ❑ **IUP was instated by Congress (2009) in support of nuclear engineering education in the US**
 - ❖ In recognition of rising importance of nuclear power & nuclear security in the national agenda
- ❑ **Motivated by concerns about:**
 - ❖ Dwindling nuclear engineering enrolments at BS, MS, & PhD levels
 - ❖ Declining number of academic nuclear engineering programs
 - ❖ Warnings of impending HR crisis due to retirement wave
- ❑ **Designed to:**
 - ❖ Diversify support sources across 3 Federal agencies: DOE-NE, DOE-NNSA, & NRC
 - ❖ Avoid disruption in funding that damages sustainability prospects
- ❑ **Required to be:**
 - ❖ Supportive of broad educational objectives (non- & programmatic \$)
 - ❖ *Integrated* by coordinating support to reduce duplication



Current IUP Arrangement

- ❑ **Annual awards are competitive, most are not confined to Nuclear Engineering academic programs**
- ❑ **DOE – Office of Nuclear Energy (NE):**
 - ❖ Administered by Nuclear Energy University Programs (NEUP)
 - ❖ \$5M in scholarships (UG) & fellowships (Grad) awarded to *students*
 - ❖ Up to 20% of NE R&D budget awarded to research projects & infrastructure support
- ❑ **US Nuclear Regulatory Commission (NRC):**
 - ❖ \$5M for curriculum development
 - ❖ \$10M: Junior faculty development; scholarship/Fellowships awarded to *universities*; Community Colleges
- ❑ **DOE – National Nuclear Security Administration (NNSA):**
 - ❖ \$5M Nuclear Science & Security Consortium led by UC-Berkeley
 - ❖ \$10M research projects relevant to nuclear security issues



Importance of IUP

- ❑ **Collectively the elements of IUP cover 3 missions of Research I university:**
 - ❖ Undergrad education: Scholarships (NE & NRC); curricula (NRC); Community Colleges (NRC)
 - ❖ Grad education: Fellowships (NE, NRC, NNSA); curricula (NRC)
 - ❖ Research: Research awards (NE & NNSA)
- ❑ **Strengthens nuclear engineering academia, more viable:**
 - ❖ Infrastructure (NEUP): Reactors & labs
 - ❖ Junior faculty development (NRC): New cadre of educators
 - ❖ Focused research centers (NEUP & NNSA): Engage national labs to address high national priorities
- ❑ **Already succeeded in:**
 - ❖ Reversing enrolments decline: continued growth even after Fukushima
 - ❖ Revitalizing existing nuclear eng. programs + starting new ones
 - ❖ Attracting young top talent to nuclear engineering academic ranks

