

**2473-42**

**Joint ICTP-IAEA School on Nuclear Energy Management**

*15 July - 3 August, 2013*

**EDUCATION AND TRAINING FOR A NUCLEAR POWER PROGRAMME**

Y. Yanev  
*IAEA, Vienna  
Austria*



*NUCLEAR POWER AND COMPETENCE BUILDING – THE NEXT  
CHALLENGES*

# **EDUCATION AND TRAINING FOR A NUCLEAR POWER PROGRAMME**

**Prof. Dr. Yanko Yanev\***, *International  
Institute for Nuclear Knowledge  
Management, Vienna,*  
[Y.YANEV@NUCLEAR-KM.ORG](mailto:Y.YANEV@NUCLEAR-KM.ORG)  
*IAEA\* NKM Section*

# Nuclear education

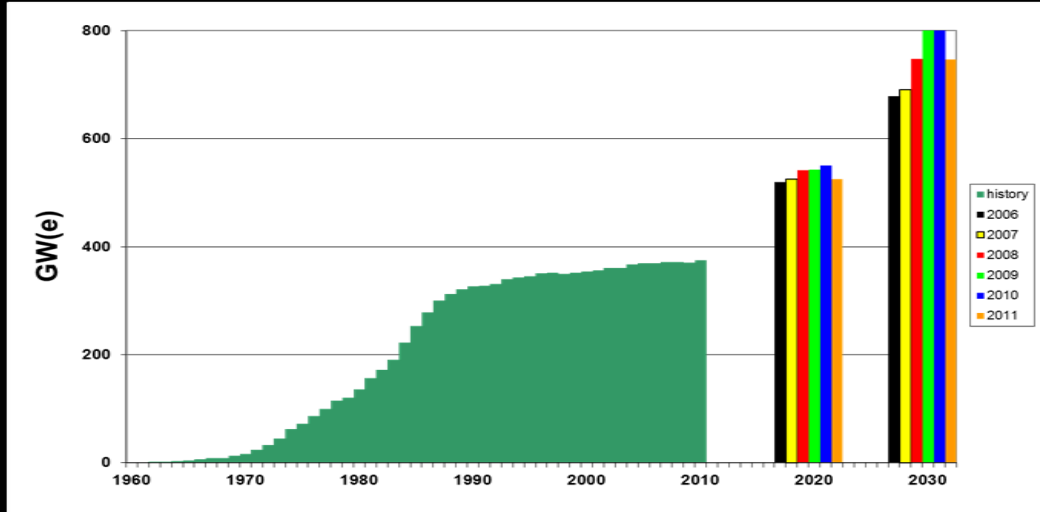


- *The Students*
- *The Teachers*
- *Courses and textbooks*
- *Infrastructure( R&D)*
- *Nuclear facilities*
- *Outreach to society*

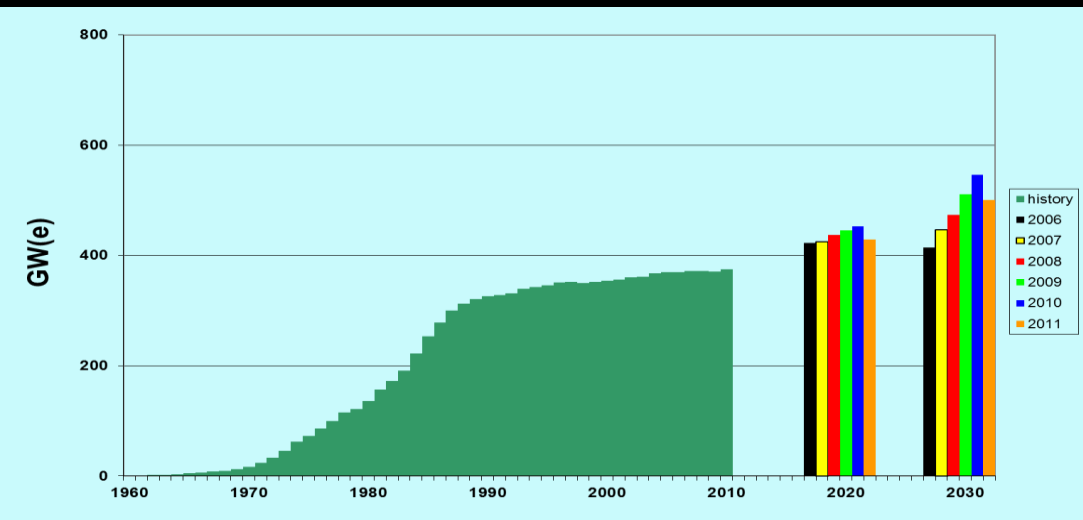
# Education and Training

- **Education** is the delivery of knowledge, skills, and information from teachers to students. Education usually ends with a diploma.
- **Training** is the process of creating competence through a systematic learning and practical exercises from an experienced trainer to an un-experienced trainee. Training is usually certified.

# Nuclear Power perspective

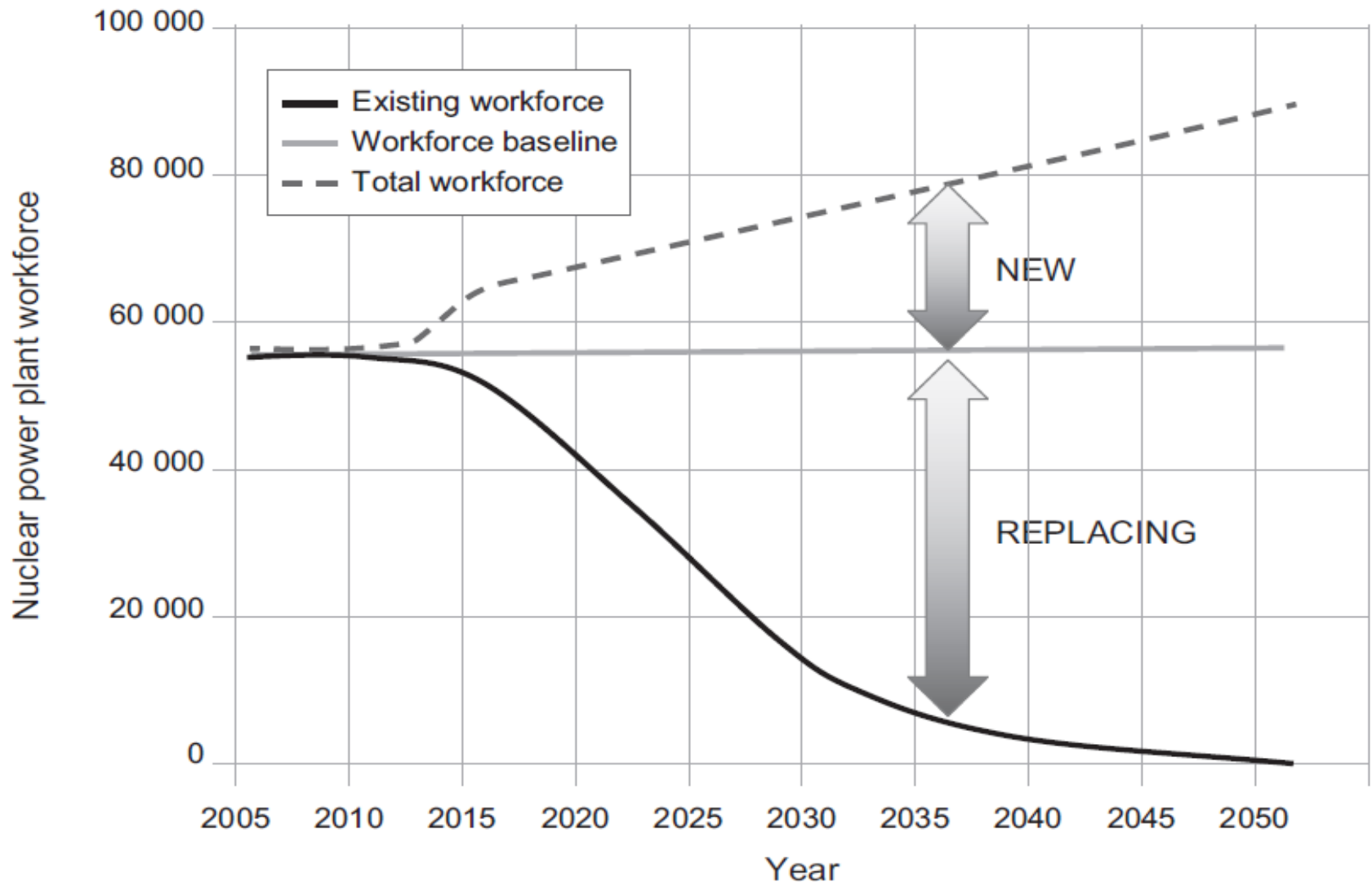


- Nuclear Power development requires very specific competences, based on *knowledge* and *understanding* as well as on *skills* and *behavior*.
- Nuclear power needs strong nuclear safety culture world-wide.
- With new countries establishing programs for introducing nuclear power the demand for harmonization becomes ever more important.

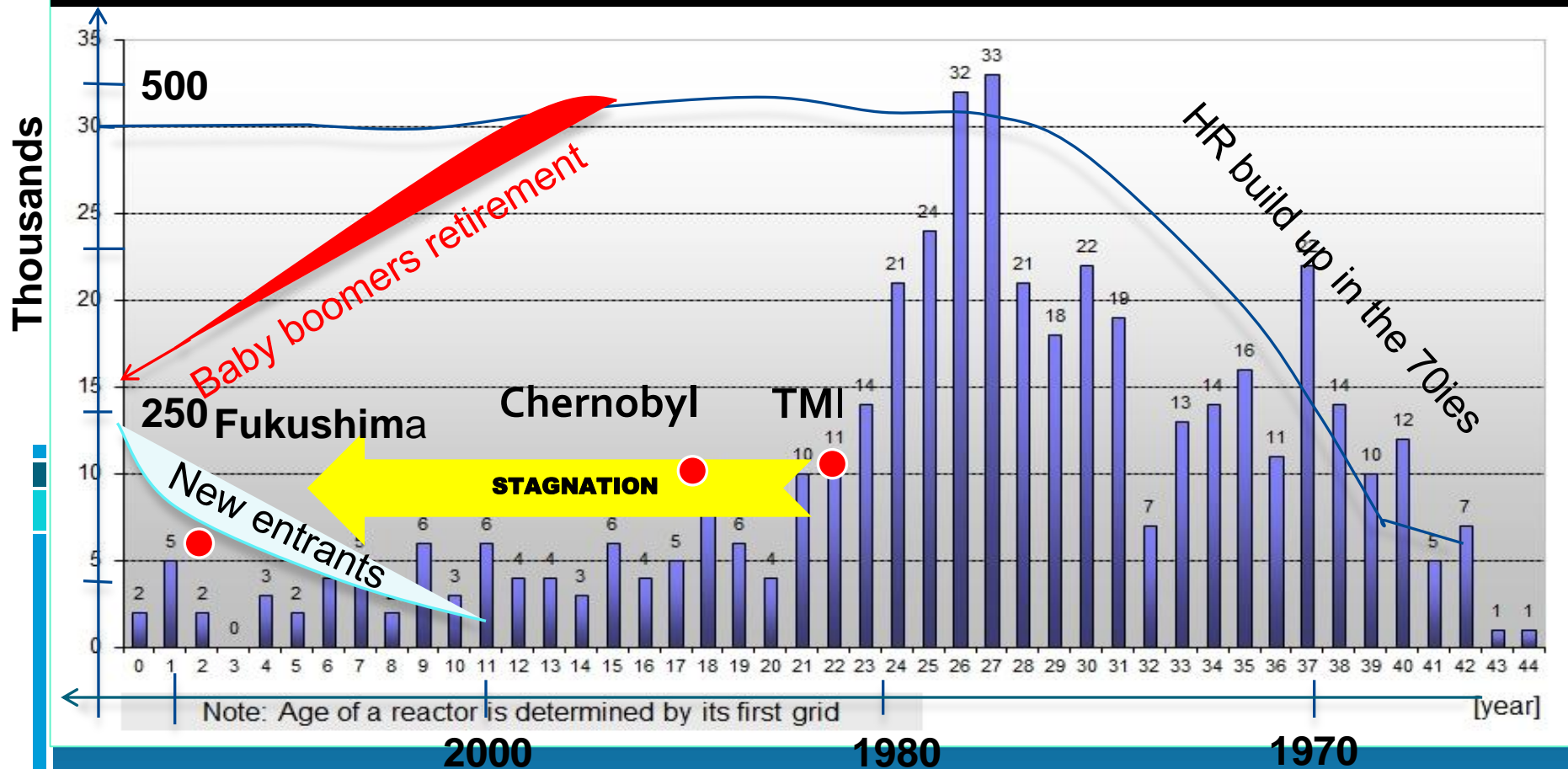


# The Nuclear Workforce Issue

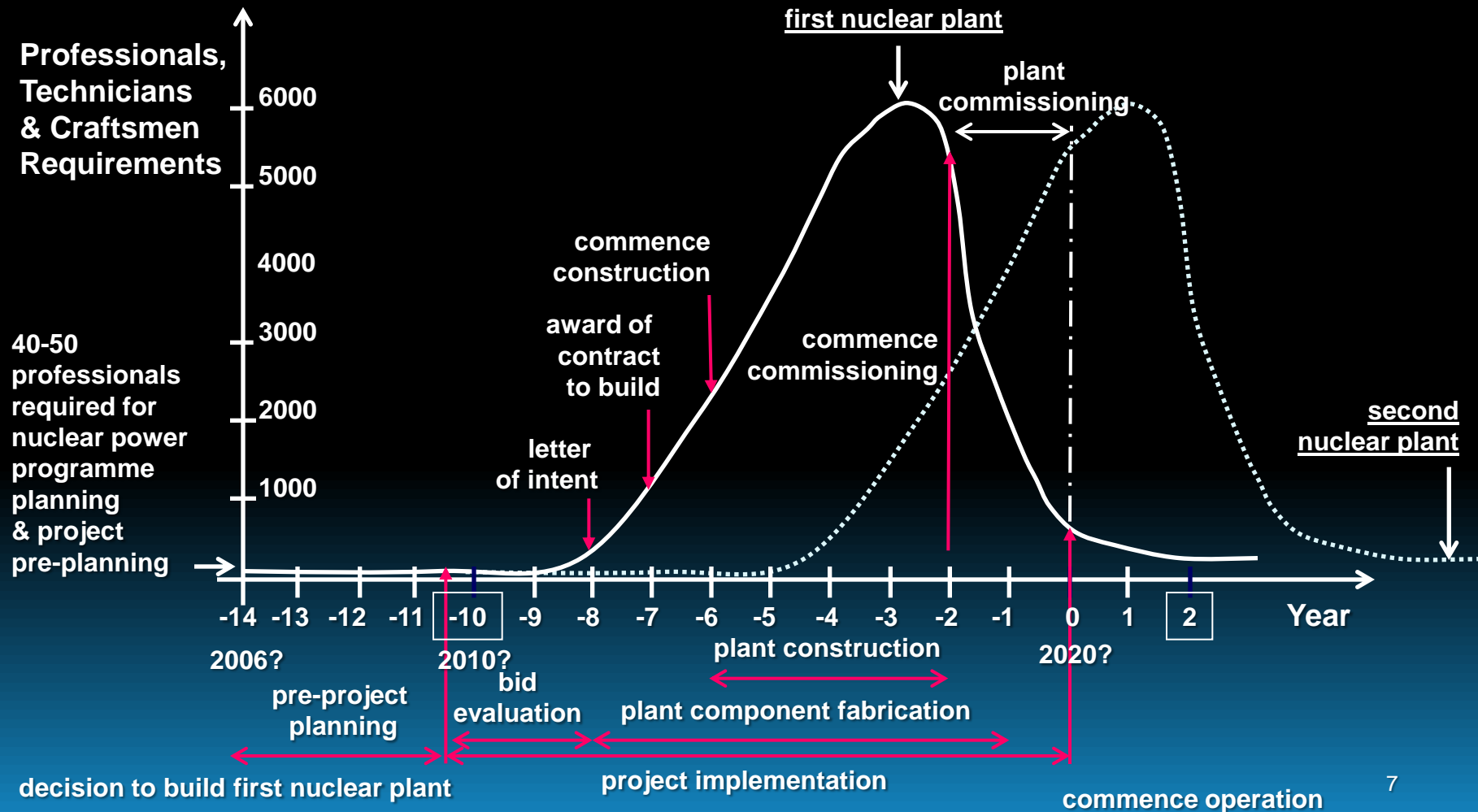
(mature countries)



# Nuclear Human Resource

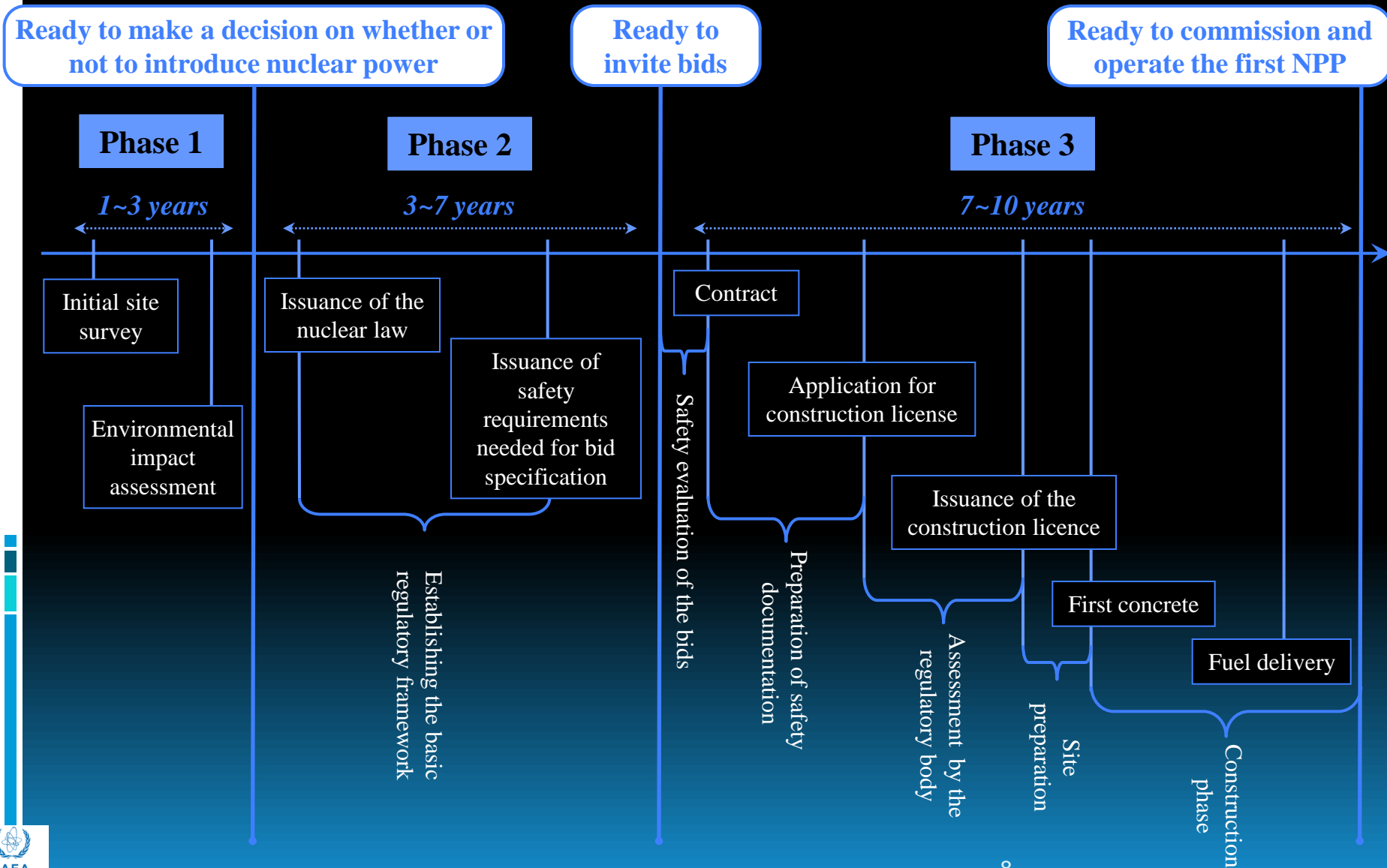


# HR involved in NPP construction and operation

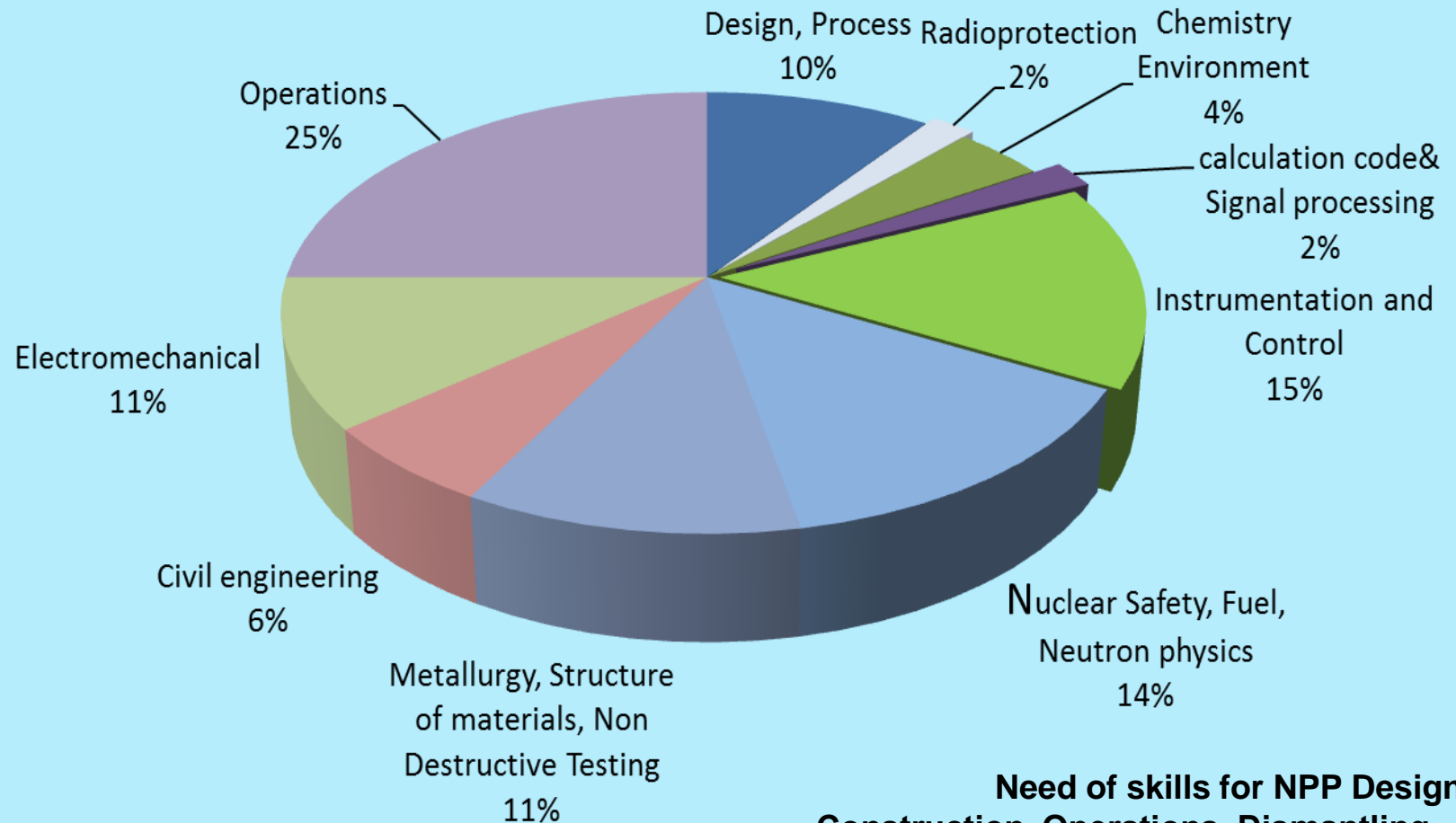




# Milestones and competency



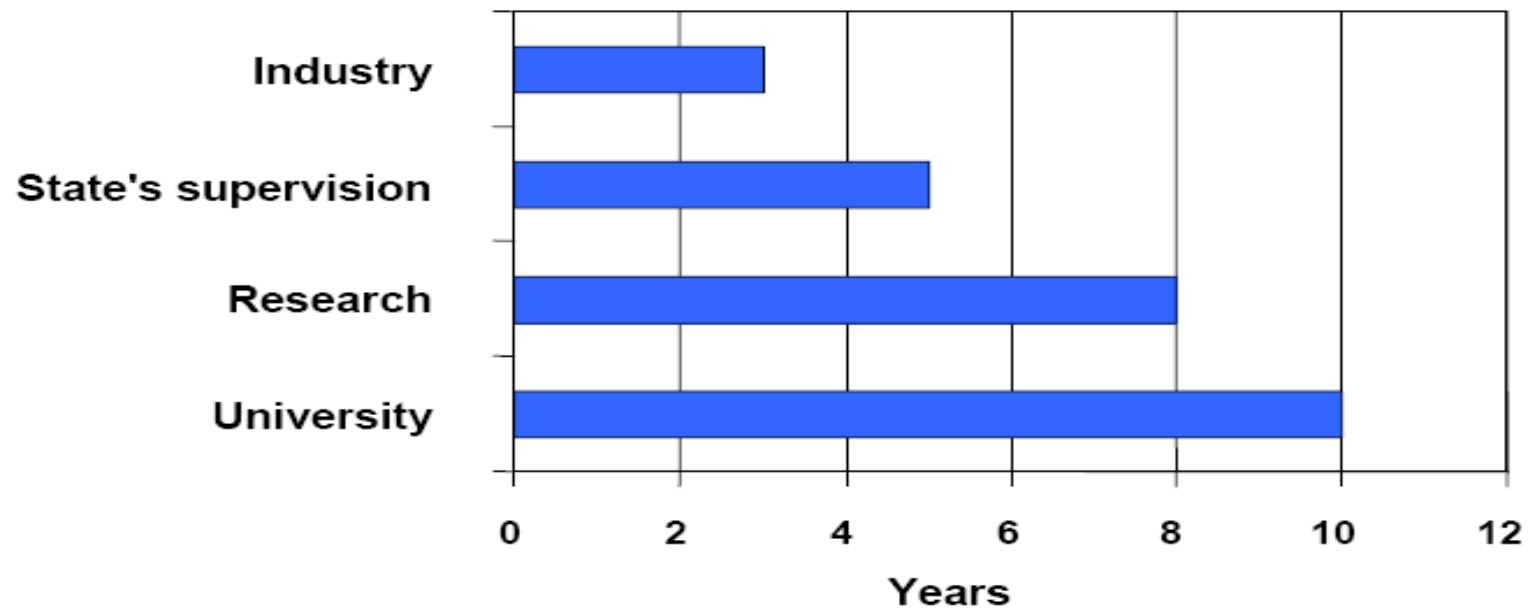
# Specialist areas needed



**Need of skills for NPP Design, Construction, Operations, Dismantling,... goes beyond pure nuclear education and training**

# Time to build competence

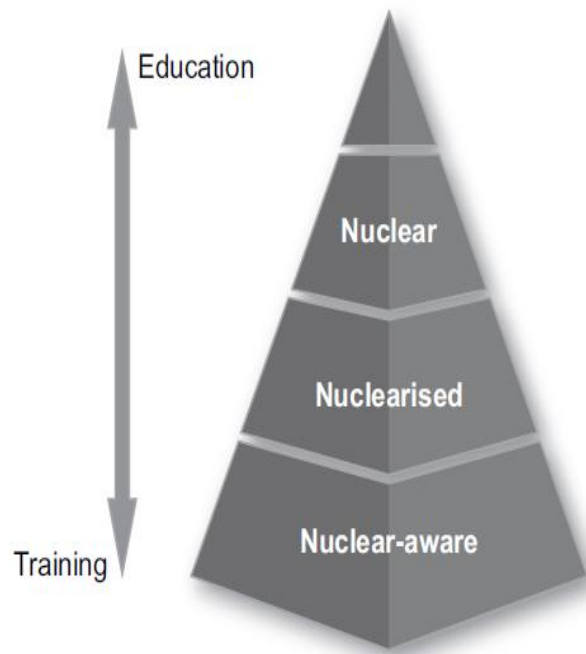
Times for establishing nuclear engineering competence



Source: S. Griffiths, J. Royen: „Assuring future nuclear safety competence“, NEA News 2000 - No. 18.1

# Nuclear Competence

## Competency range



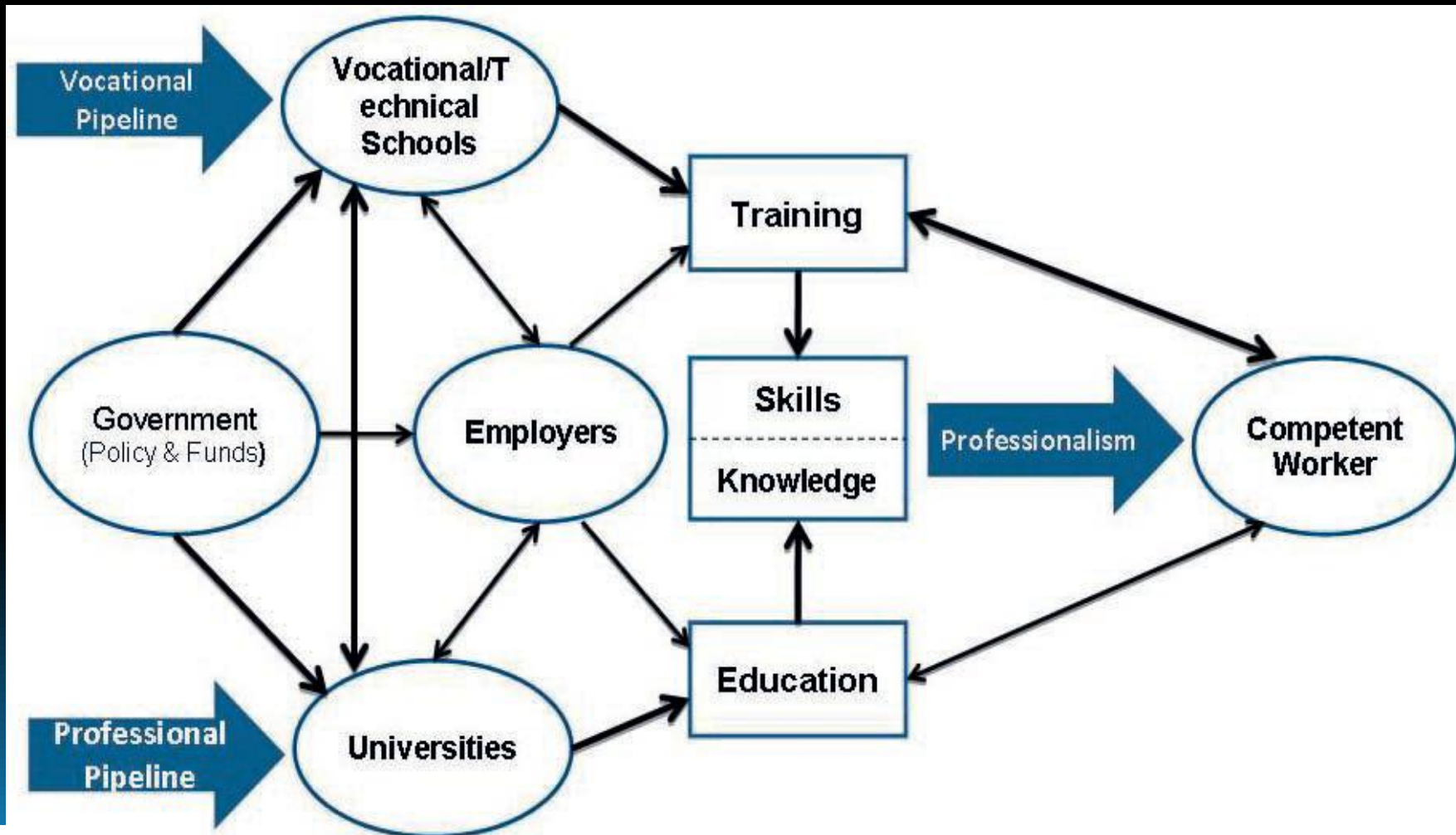
## Three levels of competence

- **Nuclear** – Profound understanding of nuclear science and technology..
- **Nuclearized** – Good knowledge of nuclear implications of other competencies.
- **Nuclear aware** – Basic knowledge for safety rules and practices in nuclear area.

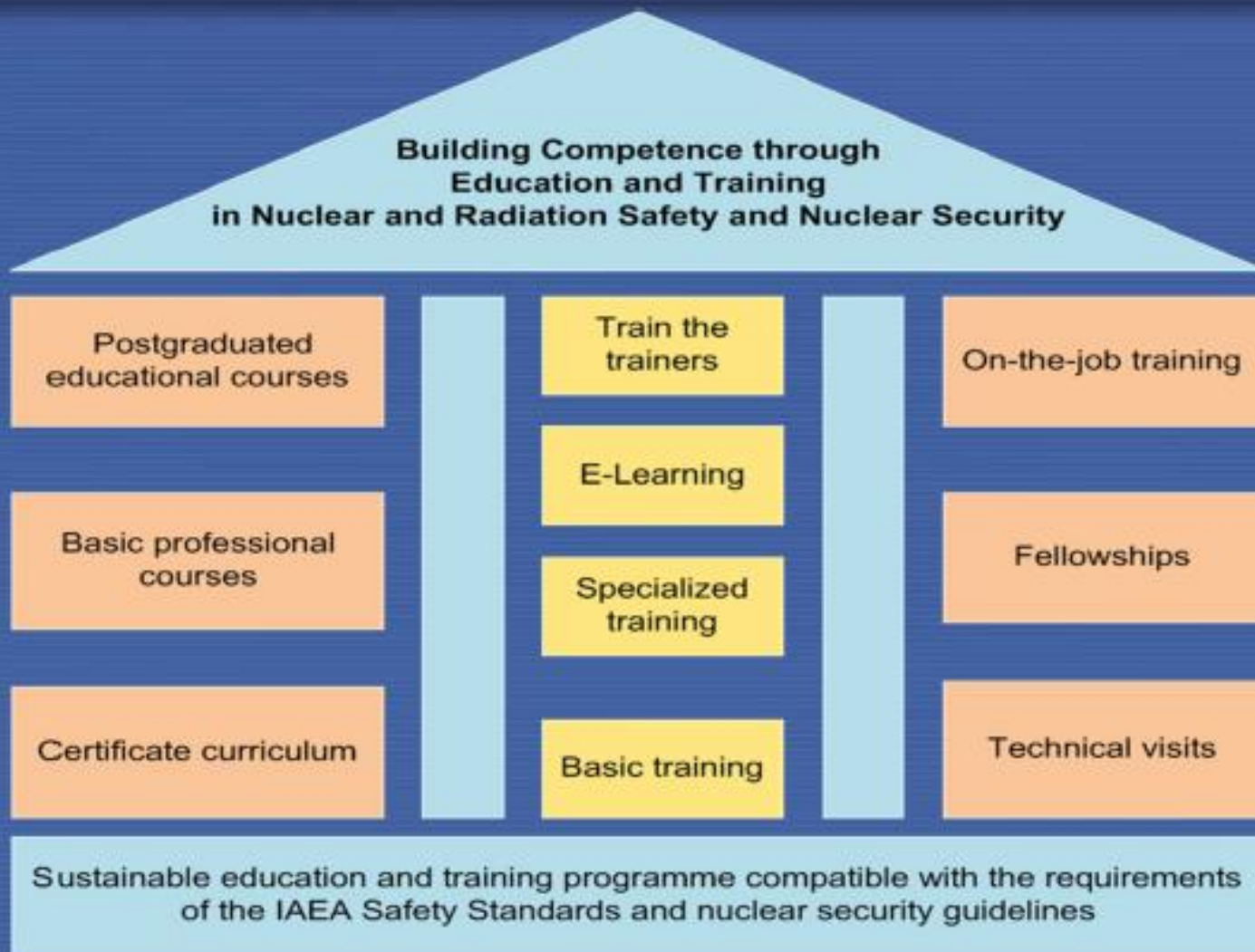
1000000



# Government–university–industry co-operation

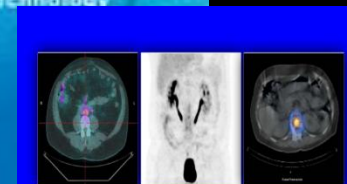
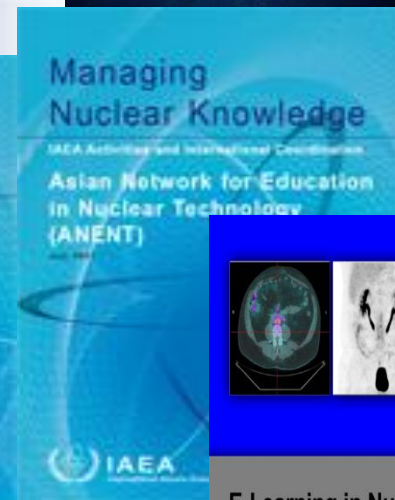
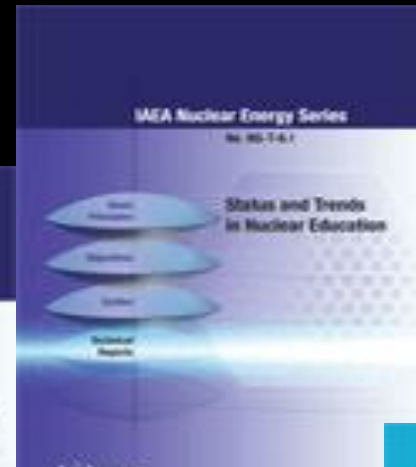
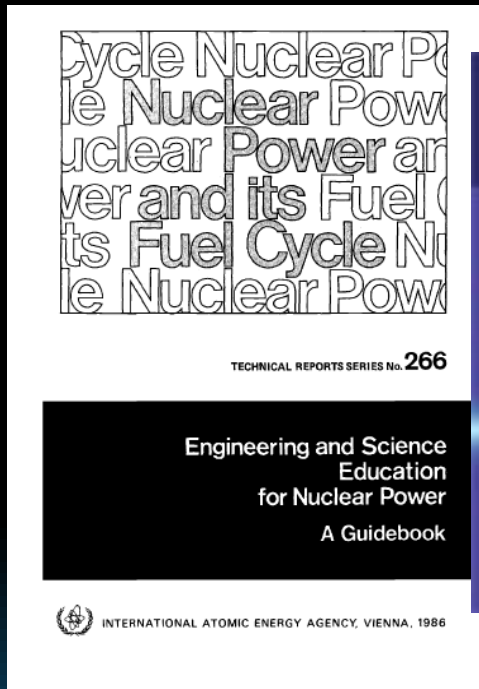


### 3. IAEA Competence building tools





# IAEA supporting Education and Training



<http://www.iaea.org/newscenter/news/2012/strengthennseducation.html>  
[http://www.pub.iaea.org/MTCD/publications/PDF/Pub1439\\_web.pdf](http://www.pub.iaea.org/MTCD/publications/PDF/Pub1439_web.pdf)



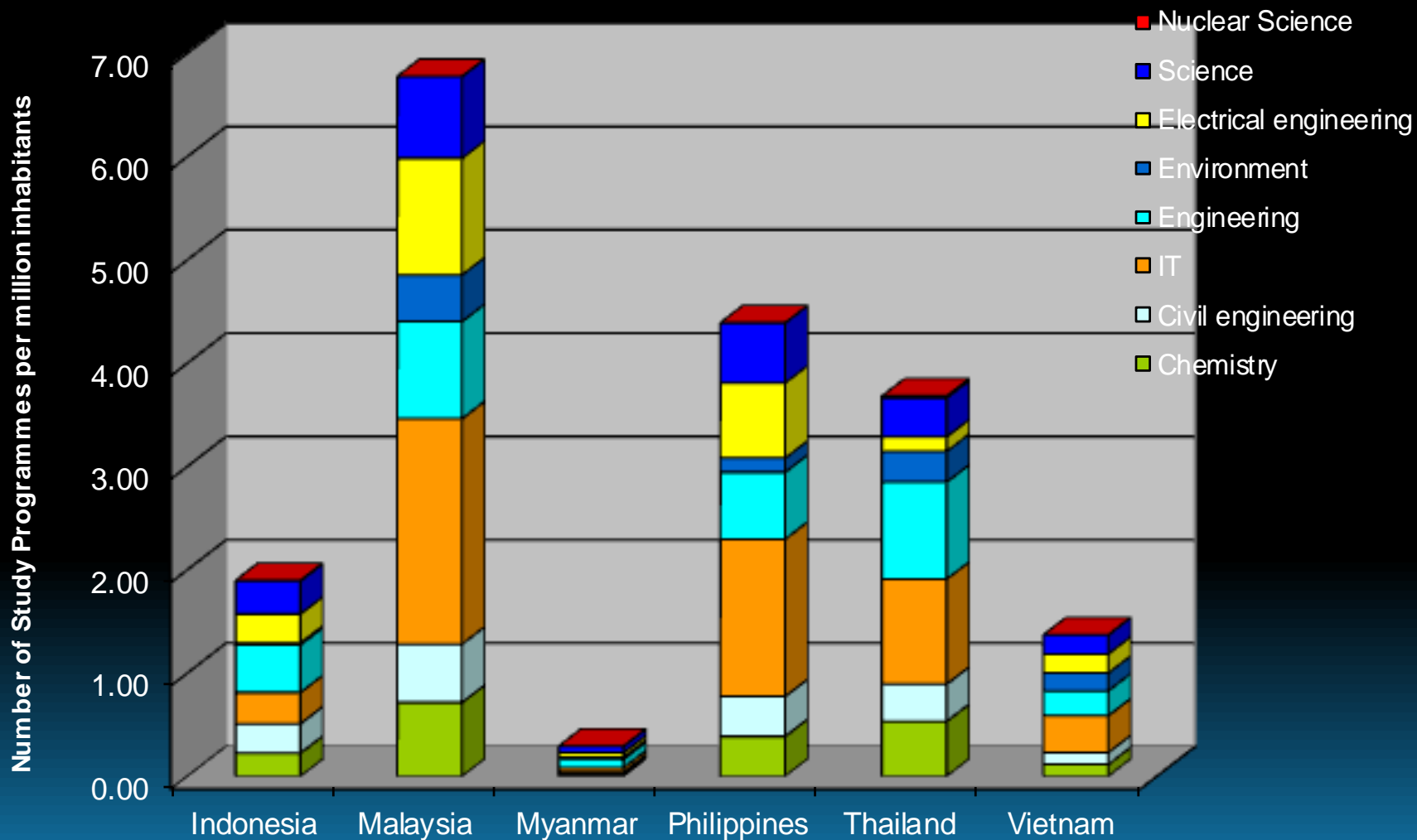


Benchmarking nuclear education potential

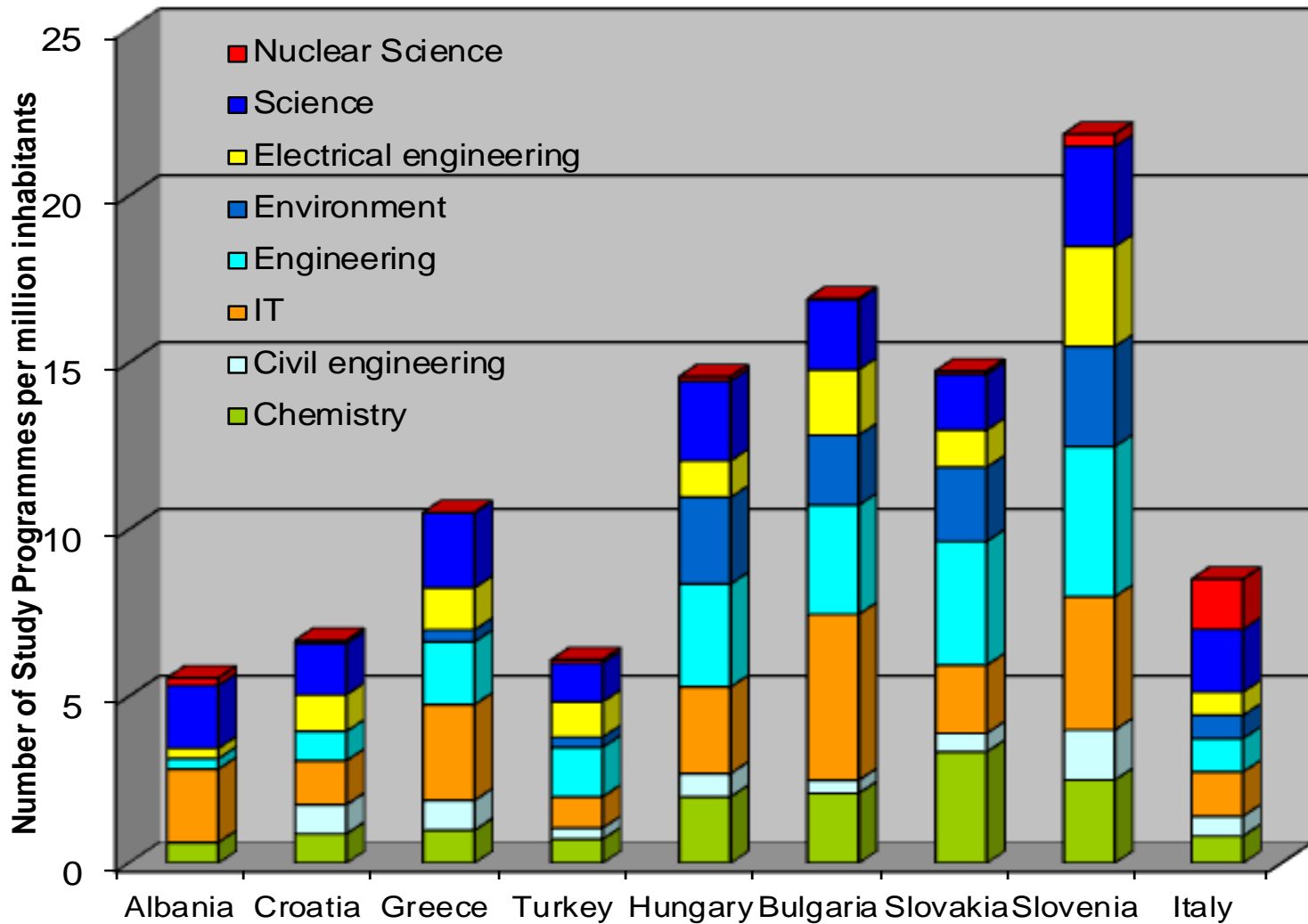
**HOW MUCH CAN WE EDUCATE AND  
TRAIN?**

Data from K4D platform of the World Bank and UNESCO

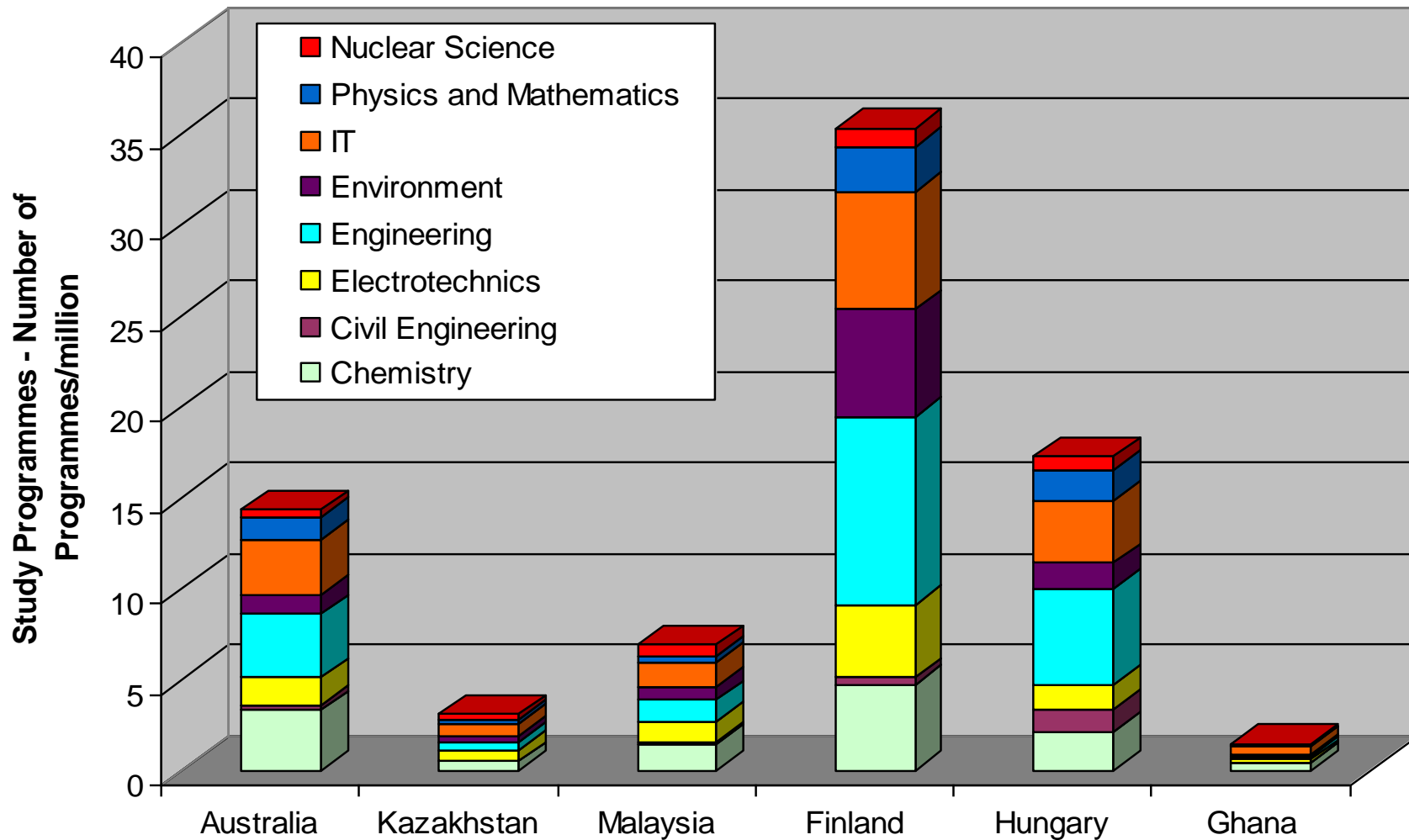
# South East Asia



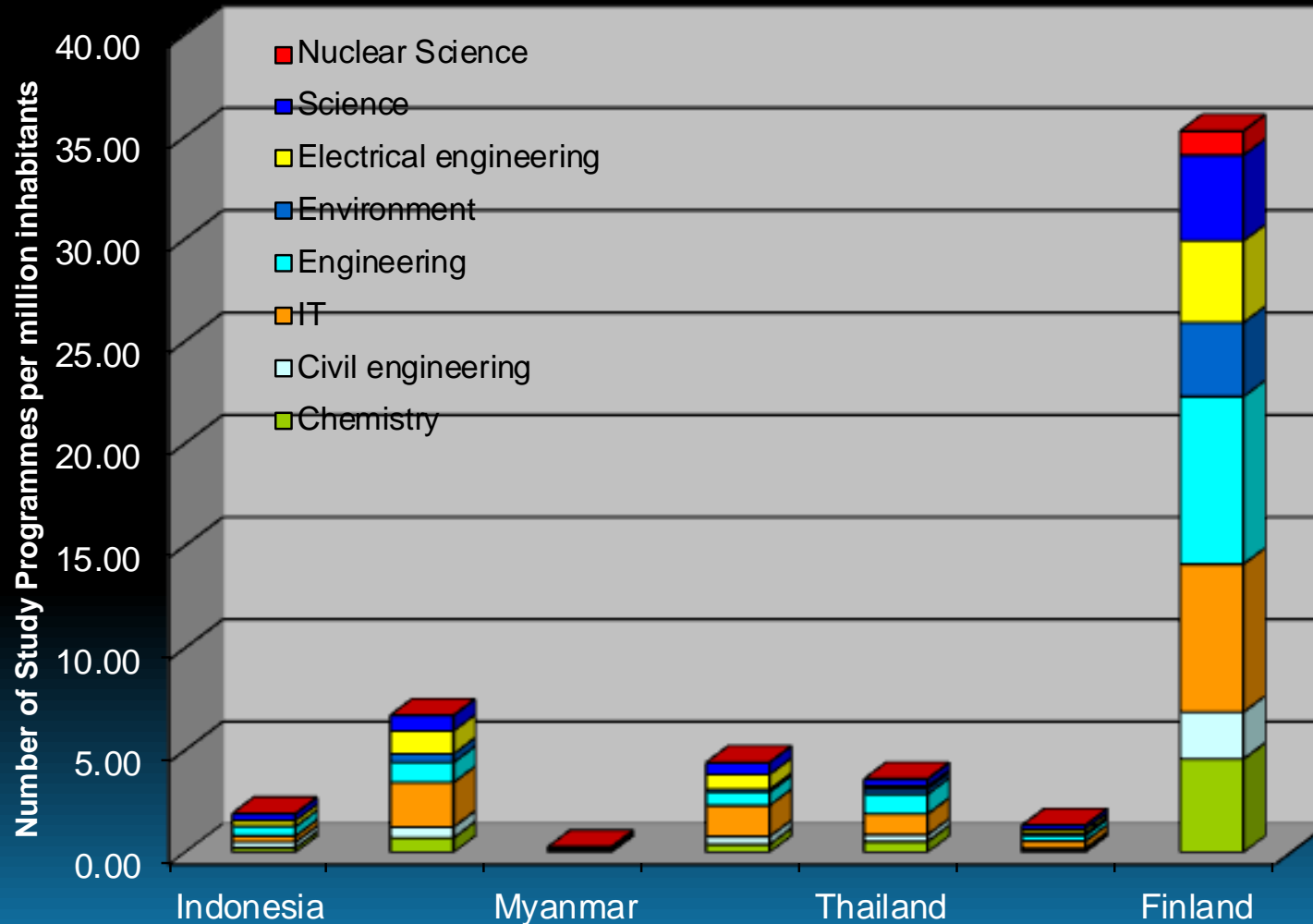
# South East Europe



# Newcomers and Mature

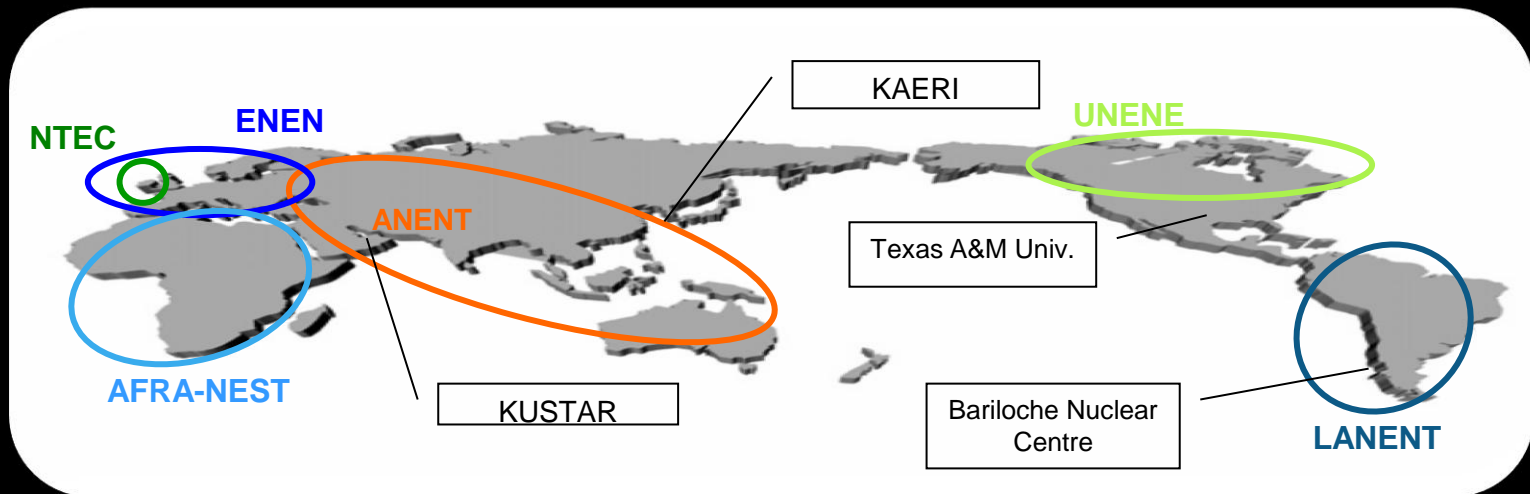


# Newcomers and Mature



# Networking Nuclear Education

*“...Networking education should be further made more efficient by interlinking networks and sharing best practices on a global scale...”* SAGNE, 2010



To provide a forum to exchange the policy and strategies for nuclear education and training and to facilitate the regional and interregional cooperation to share educational experiences and resources:

- The Asian Network for Education in Nuclear Technology (ANENT)
- The European Nuclear Education Network Association (ENEN)
- The Nuclear Technology Education Consortium (NTEC)
- The University Network of Excellence in Nuclear Engineering (UNENE)
- African Regional Cooperative Agreement – Network for Education in Nuclear Science and Technology (AFRA-NEST)
- Regional Cooperative Agreement in Latin America and the Caribbean (ARCAL) – Bariloche Nuclear Centre in Argentina



# Harmonization



- **"Harmonization"** is the name given to the effort by industry to replace the variety of product standards and other regulatory policies adopted by nations in favor of uniform global standards.(Wikipedia)
- Considered in the case of IAEA **Harmonization of E&T** will stand for comparison(benchmarking) of nuclear educational standards, learning objectives, curricula, training materials, methodology, regulatory practices and requirements etc. with IAEA recommendations and guidance and providing a uniform global educational approach between the vendor countries.





**THANK  
YOU**