



# UNENE Nuclear Education & Training Status update

Presented to: IAEA TM on  
Innovative Nuclear Education & Training  
April 23-26, 2012  
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UNENE, President

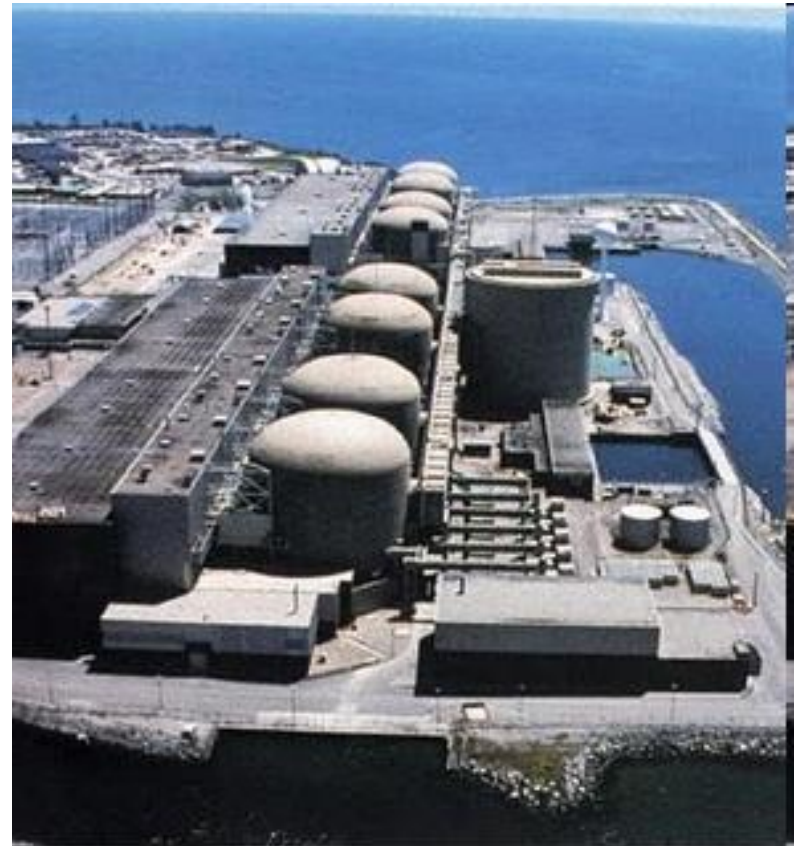


# Outline

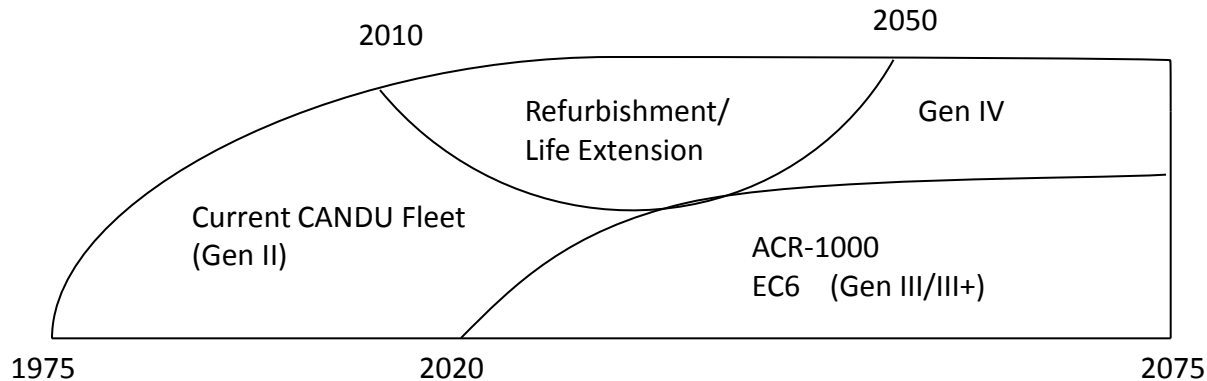
- Canadian Scene
- What is UNENE
- UNENE Educational Program
- Current Challenges/Path Forward
- Summary

# Canadian Scene

- 17 operating nuclear power plants in Canada
  - 16% of Canada's electricity
  - >50% of the electricity of Ontario province
- Phase-out of coal
  - Significant supply gap ~ 2015
- New nuclear build + life extension
- Retirement of experienced nuclear engineers
- Hundreds of new nuclear engineers needed



# Canadian Scene: Nuclear Knowledge and Industry Priorities



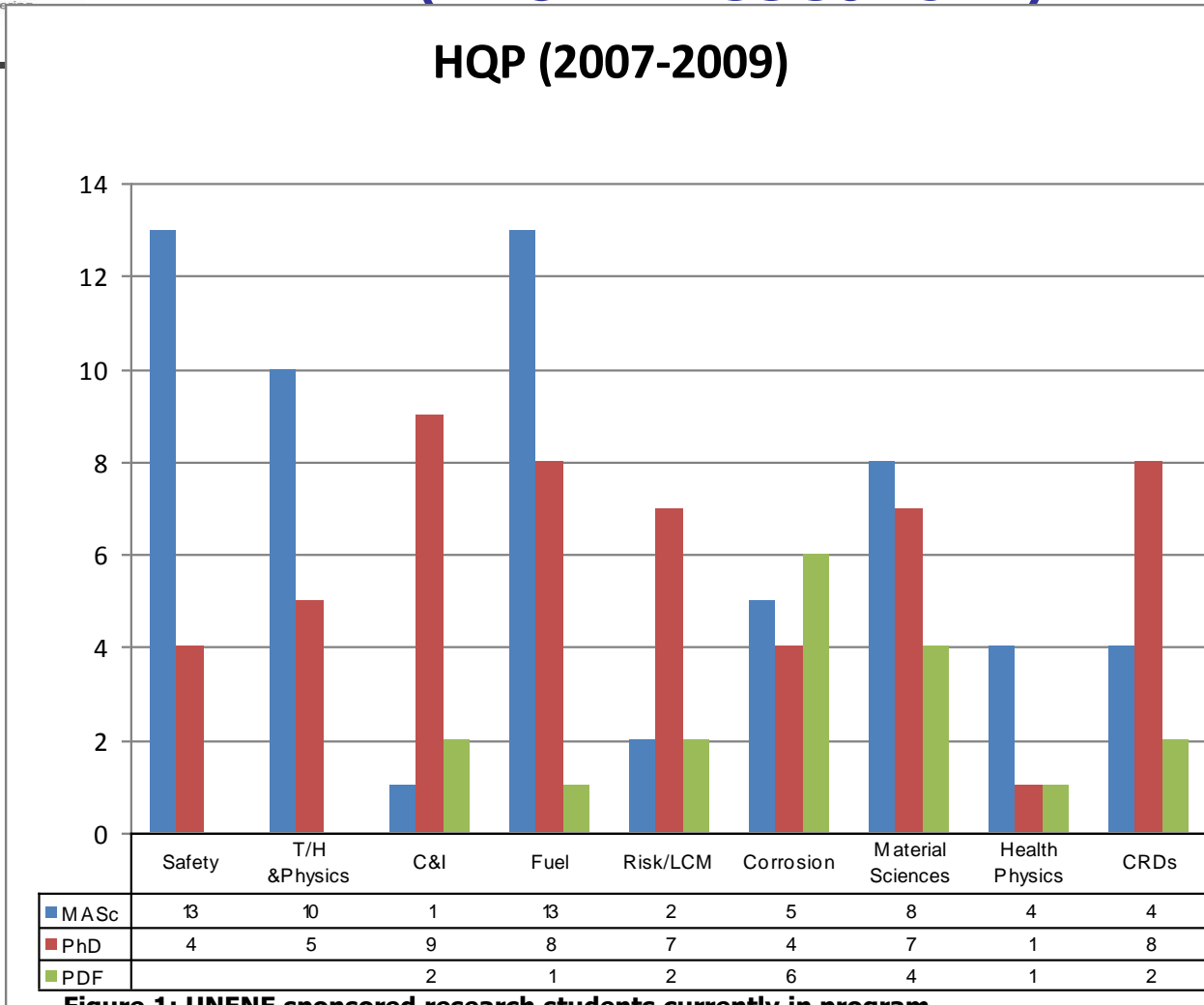
- Maintain knowledge in design/licensing basis of current fleet of Nuclear Plants
- Support safe Long Term Operations & Competitiveness of Nuclear Plants
- Enable, through innovations, a future generation of reactors (Gen III, Gen IV)



# UNENE: A Partnership

- Established in 2002 between the industry-universities with the following objectives:
  - Supply of Highly Qualified Personnel (HQP)
  - Support and fund nuclear research in universities
  - Create a respected pool of university-based expertise for independent industry and public consultation
- Main focus: Education and Research

# Training/Development of HQP (From Research )

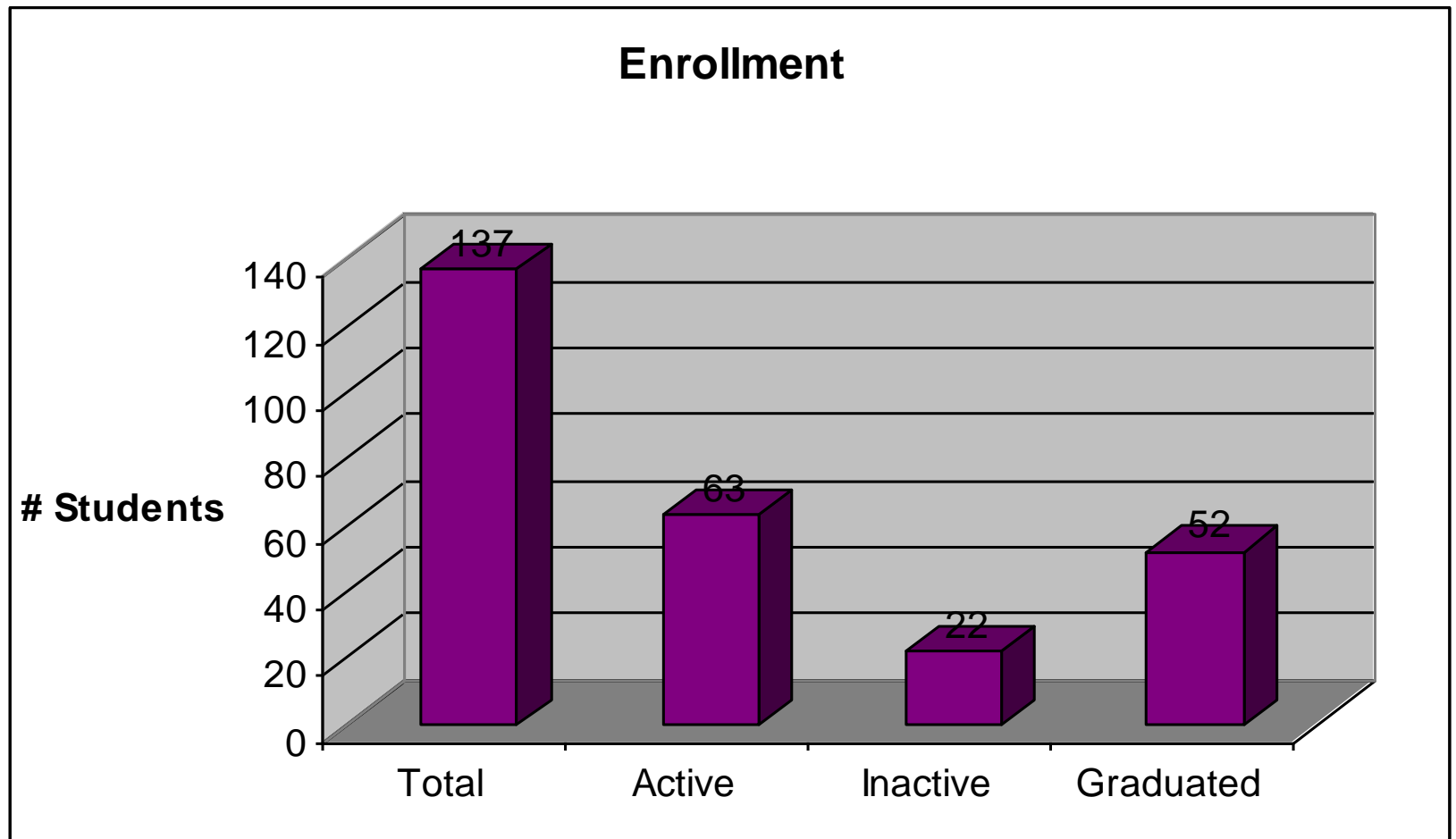


**Figure 1: UNENE sponsored research students currently in program (Industrial Research Chairs and Collaborative Research and Development grants)**

20/04/2012

IAEA, shalaby, TM April 2012

# Training/Development of HQP (from Education)





# Education – UNENE M.Eng.

- Accredited course based:
  - 10 courses or
  - 8 courses plus a project
  - 3 of the 10 courses can be Business Courses from Advanced Design and Manufacturing Institute (ADMI)
  
- Geared to the working professional
  - Topics are relevant to work in industry
  - Scheduled outside working hours





# Typical Courses

- UN0802: Nuclear reactor analysis
- UN0801: Nuclear plant systems and operations
- UN0804: Nuclear reactor heat transport system design
- UN0803: Nuclear reactor safety design
- UN0603: Project management for nuclear engineering
- UN0901: Nuclear materials
- UN0805: Radiation health risks and benefits
- UN0702: Power plant thermodynamics
- UN0701: Engineering risk and reliability
- UN0601: Control, instrumentation and electrical systems in CANDU
- UN1001: Reactor chemistry and corrosion
- UN0902: Fuel management
- UN0602: Nuclear fuel waste management



# Delivery Modes

- Lecture time typically 40 hours per course
  - Given on 4 alternate weekends in Whitby
  - Distance Learning tools for all courses for remote students
    - In real time; also recorded for later review
- Discipline refreshers before key topics
- 3-5 years to get the degree



Participants

| Participants        |   |  |  |  |  |  |  |  |  |
|---------------------|---|--|--|--|--|--|--|--|--|
| Robin Chaplin (M... | 1 |  |  |  |  |  |  |  |  |
| Dan                 |   |  |  |  |  |  |  |  |  |
| Ernest              |   |  |  |  |  |  |  |  |  |
| Hussain Al-Bassam   |   |  |  |  |  |  |  |  |  |
| Ishan Roy           |   |  |  |  |  |  |  |  |  |

Chat

Show All

Hussain Al-Bassam: just want to confirm that the system you described for the heat cycle only applies to a compressible fluid?

Hussain Al-Bassam: thank you

**Left on February 26, 2011 at 10:39 AM**

**Joined on February 26, 2011 at 10:57 AM**

Send to This Room

Audio - Robin Chaplin

Microphone and speaker volume sliders with icons and 'Ctrl+F2' label.

Whiteboard - Main Room

**Application Sharing**

UNENE Thermo Primer Section 3.pdf - Adobe Reader

File Edit View Document Tools Window Help

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Click to go to the next page in the document

### HEAT CYCLE

Heat is the result of temperature differences and has the same units as work. It is convenient to measure work output (J/kg) as an area on a plot with temperature on one axis. Thus we get units of J/kg°K on the other axis. This is entropy s.

# Benefits

- Professional development
- Recognition by their company
- Formal degree
- Career enhancement
  - Better candidate for internal competitions
  - Mentor the new staff
  - Demonstrated capability for hard work, self-discipline, learning and self-motivation
  - Greater flexibility in job placement
- Courses given in off hours

# Current Challenges

- Fee structure ;not competitive with other similar programs
- Inability of non UNENE students to enroll
- Inability of “out of province” students to enroll
- Decreased industry training budgets
- The current M.Eng course requirements too long /costly for many industry professionals



# Path Forward

- Recommendation made to the Board of Directors (BoD) to endorse enrollment from out of province and non UNENE students
- Diversify educational program to include Diploma, 1-2 course completion certificates, technical in house training to industry
- Make a case to BoD to lower fees.

# Summary

- To date the UNENE educational program has proved to be successful
- New directions for training and education have been identified to increase student base and meet various industry needs
- Distance learning is working well but classroom learning has its benefits
- E&T options for offshore Candu utilities are being pursued