Nuclear education in Slovakia

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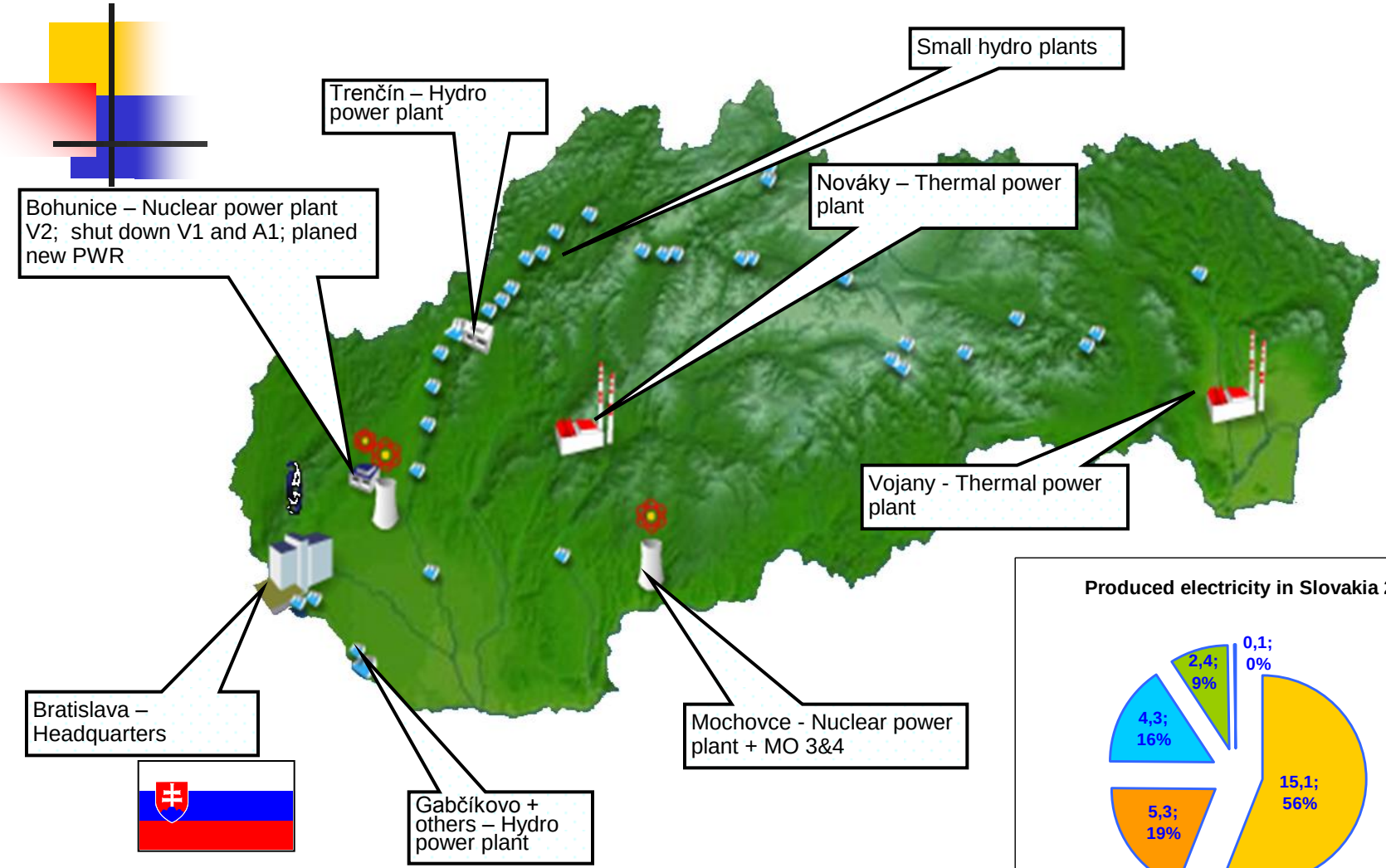
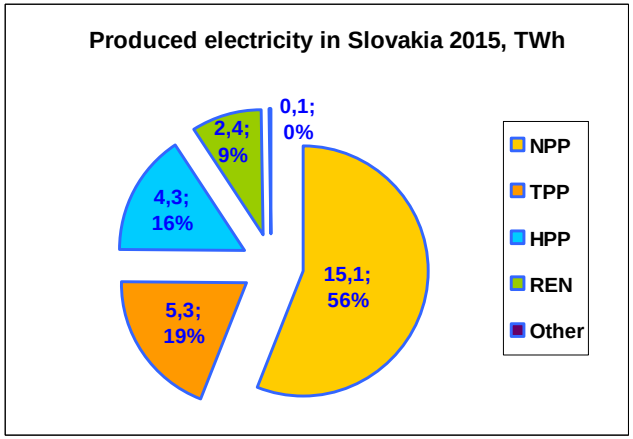
Content

- Nuclear energy in Slovakia
- Nuclear education
- Collaboration with nuclear industry
- International collaboration - organization of courses

Slovak Power Plants

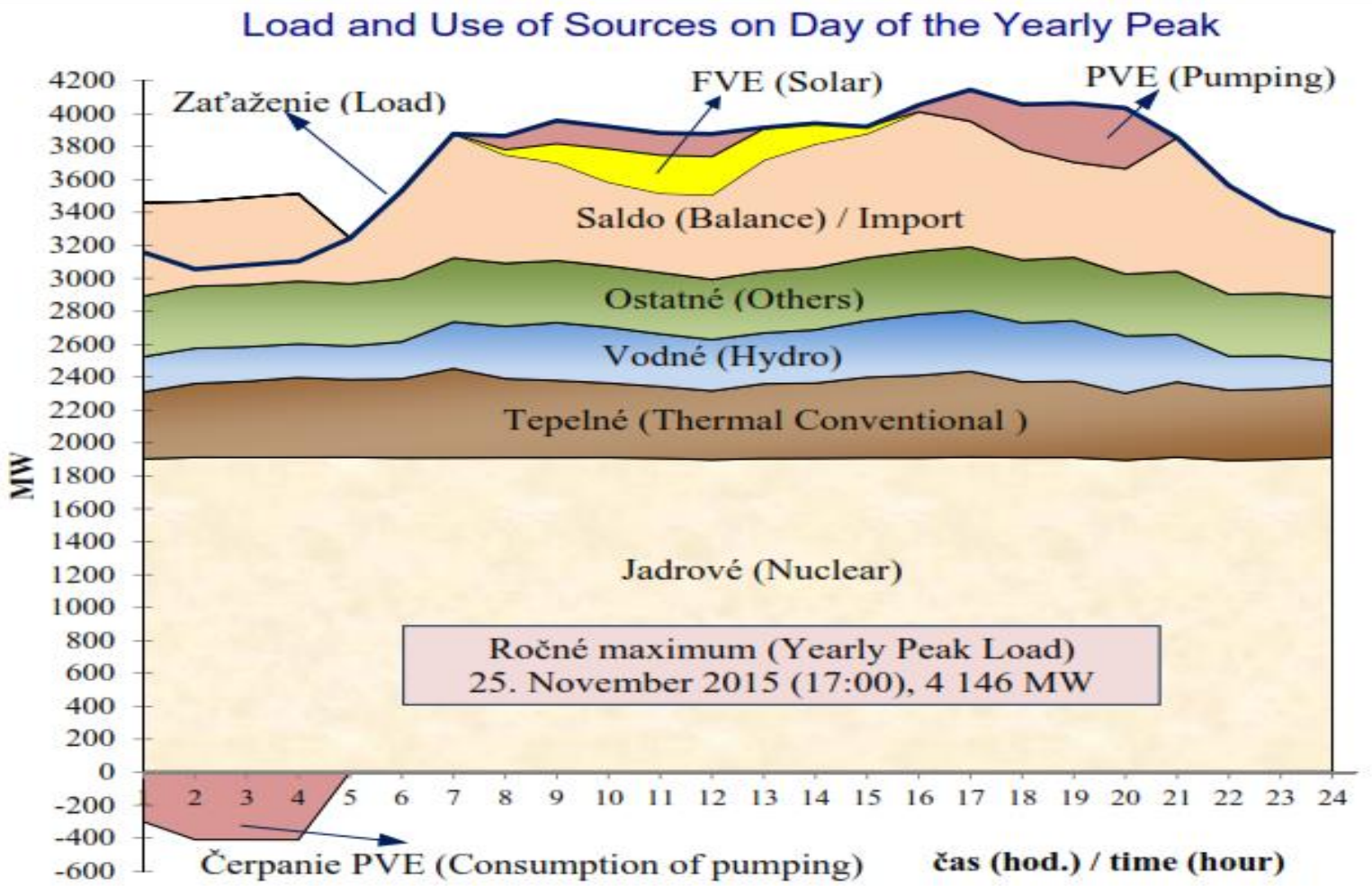




Energy sources in Slovakia

- Limited amount of coal
- Effectively used hydro potential of country
- Practically no gas, no oil
- Limited possibility for wind, solar and bio mass power
- Contribution to electricity production in 2015 at -Thermal PP – 19,32%; Hydro PP – 15,95%; Nuclear PP – 55,7%; Renewable 8,77%; others 0,26%

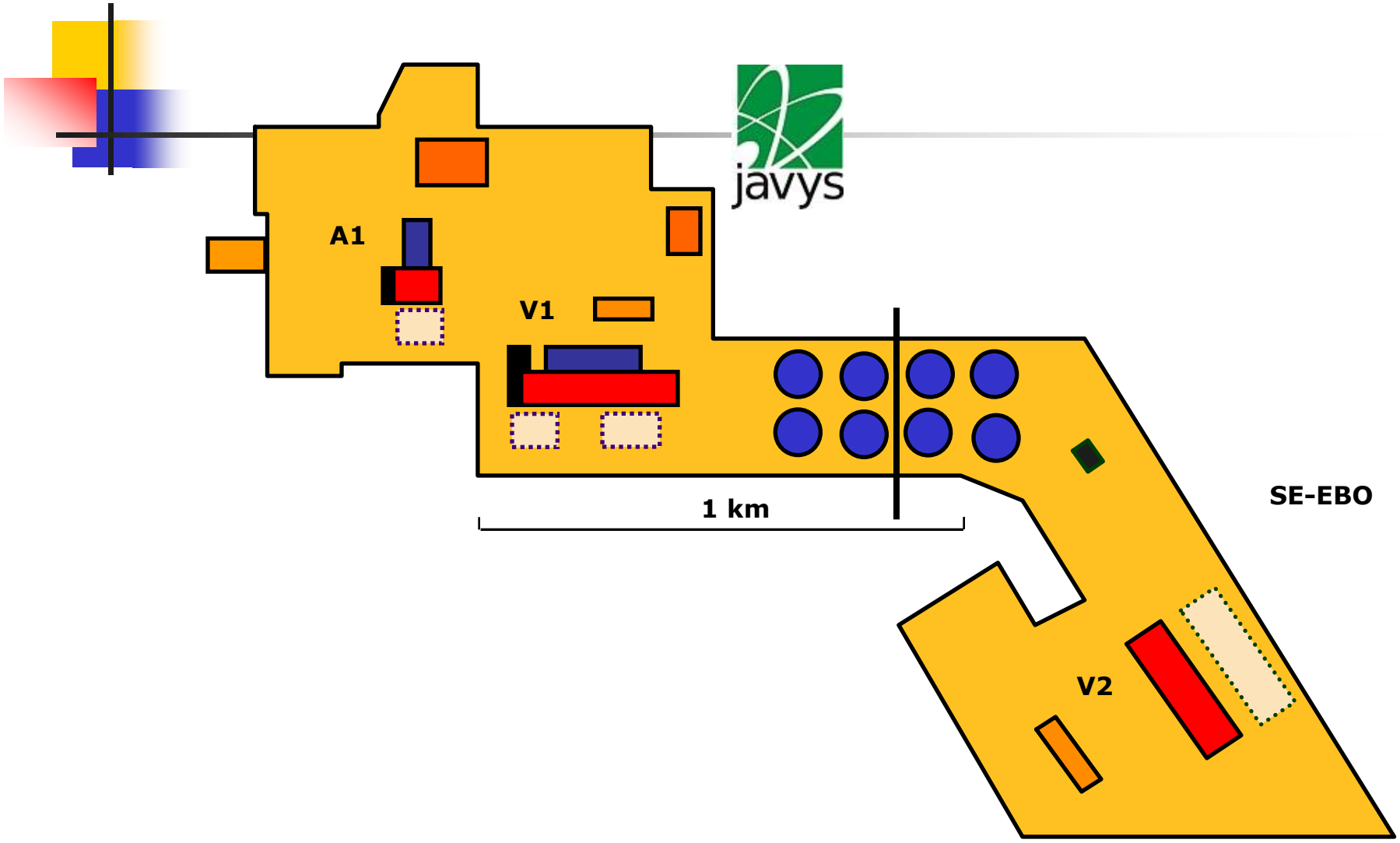
Nuclear power is un replaced energy source in Slovakia



Changes in Slovak energy sources

- Privatization of the SE, ENEL merge to SE at April 28th 2006; ENEL (66%) – new utility JAVYS
- 18.12.2015 EPH Slovakia bought 50% of ENEL in SE a.s.
- Slovakia → EU → V-1 shutdown in 2006 and 2008
- Decommissioning of 2 VVER-440/230 units
- Since November 2010 completion of MO 3&4, commissioning of both units at 2017/2018.

Jaslovske Bohunice (SE-ENEL; EPH part)



Jaslovske Bohunice site

Mochovce site

Nuclear education in Slovakia

- STU – in principle three faculties from sevens, practically only FEI
- KU – two faculties
- SNEN for preservation nuclear knowledge

NE on FEI STU

- Bologna Declaration – three levels of university education BcS-3 years, MSc study-2 years, PhD study-3 years
- BcS – 8 programs/ Nuclear and Physical Engineering
- MSc study-8 programs/ Nuclear and Physical Engineering –
- PhD study - 10 programs/ Nuclear Power Energy - Material science engineering

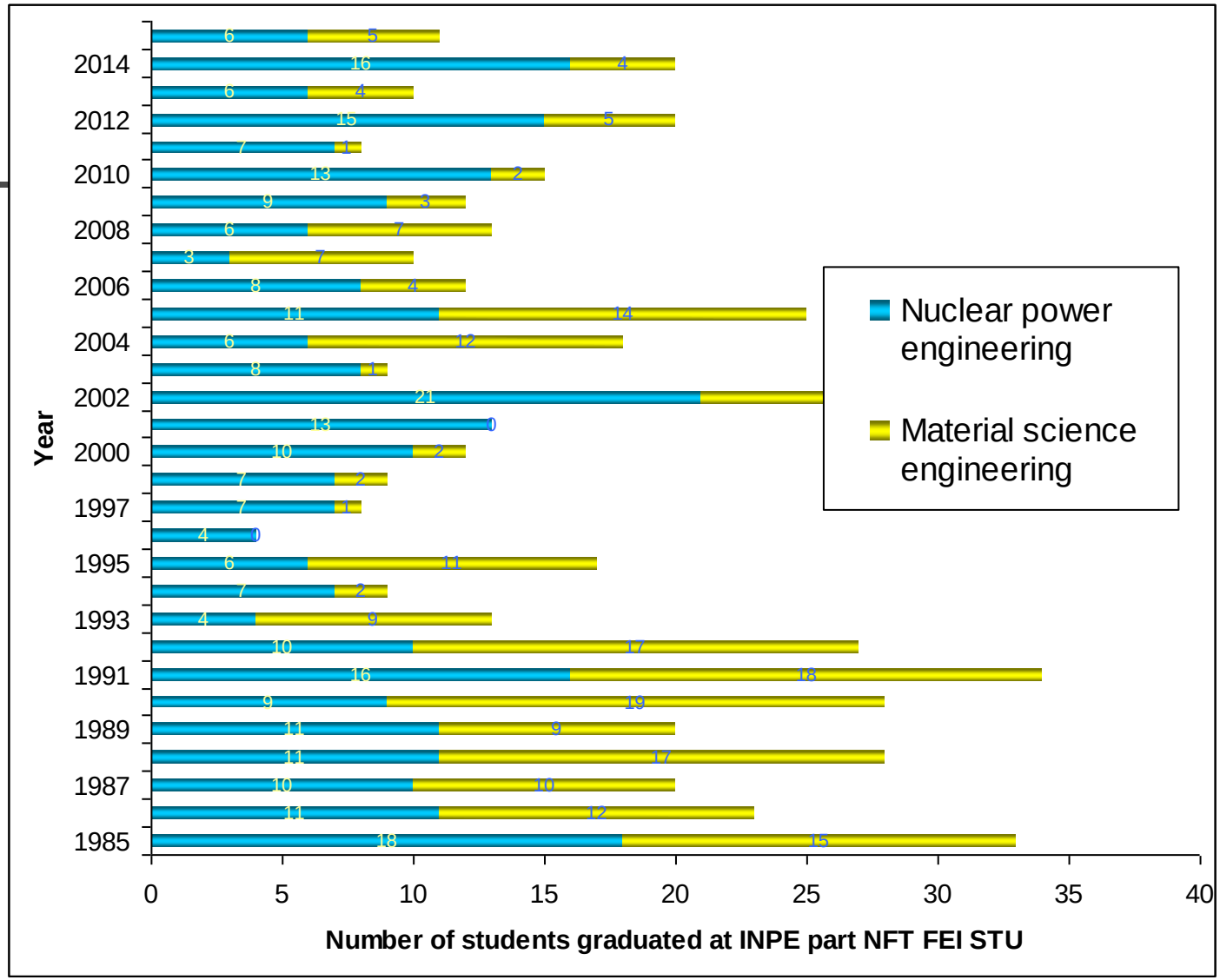
Nuclear Engineering

- Undergraduate study (BSc): 6 - Nuclear Installations, Environmentalist; Nuclear Physics and technology; Modelling and simulation; Nuclear Reactors; Materials of NPP and Bachelor thesis
- Graduate study (MSc): 13 – Dosimetry; Nuclear Electronics and detectors; Structure of Materials and technology; Safety and Reliability of Power Installations; Experimental methods; Radiation ecology; Theory of Nuclear Reactors; Thermal mechanics; Mechanical equipments of NPP, Experimental Reactor Physics, Measurements and Control of NPP; Decommission of NPP, Operation of NPP, diploma thesis

Nuclear Engineering (2)

- Postgraduate study (PhD)- 10 programs
- Programme - *Nuclear Power Engineering* (6 students)- Nuclear and Neutron Physics, Theory and Construction of Nuclear Reactors, Operation and Safety of NPP, Dosimetry and Radiation Protection, Materials and Decommissioning of Nuclear Installations, Thermodynamics of Nuclear Reactors, Computer Simulation at Nuclear Power Engineering, Statistical Methods of Data Evaluation, Electric facilities of NPP, Economics of Nuclear Power Engineering
- Doctoral thesis

Our product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Number of students graduated at INPE part NFT FEI STU
Nuclear power engineering
Material science engineering

Post Graduated Course "Safety Aspects of NPP Operation"

- Target group: operations staff of NPP, NRA officers, young researchers, nuclear safety specialists
- Conditions: graduated of university
- At least two years practice of nuclear industry
- From 1996 finished 15 runs of the courses (last December 10th 2014)
- Going preparation of 16th rum of course, expected to open it in February 2017.

Post Graduated Course "Safety Aspects of NPP Operation"(2)

- Two semesters study
- Six subjects all together 90 hours of lectures per semester
- Examination after finishing of lecture
- Visit of selected Swiss nuclear installations
- Final thesis (~ 60 hours) and its defense

Post Graduated Course "Decommissioning of Nuclear Installations"

- Target group: Staff of JAVYS, NRA officers, young researchers, nuclear decommission specialists
- Conditions: graduated of university
- At least two years practice of nuclear industry
- From April 2011 finished 2 runs of the courses (last December 17th 2013); at present going third run.

Post Graduated Course "Decommissioning of Nuclear Installations"(2)

- Two semesters study
- Five and Six subjects all together 90 hours of lectures and exercises per semester
- Examination after finishing of lecture
- Visit of selected Swiss nuclear installations
- Final thesis (~ 60 hours) and its defence

Periodical preparation of NPP supervising physicists

- Organized since 2002
- Five days per year
- Theoretical preparation two days in STU Bratislava
- Three days Reactor physics experiments on training reactors in Budapest/ Prague/Vienna.

Organisation of training courses

- Safety, management and utilisation of research reactors
- Eugene Wigner training course on "Reactor Physics Experiments" since 2003; four runs till now.
- Course on Nuclear Safety for NPP subcontractors – May 2005.

Safety, management and utilisation of research reactors

- IAEA regional training course
- Organised for young experts from Czech Rep., Greece, Hungary, Poland, Portugal, Ukraine, Turkey, Slovenia, Slovakia, Romania, Russian Federation
- March 3rd - 26th 2001.
- STU Bratislava – TU Vienna

E.W. Course

- Created as pilot project of ENEN
- IAEA support
- Collaboration of four universities: BUTE, CVUT, STU and TUV
- Participants – university students, PhD students and young professionals from A, B, BG, CZ, Fi, Hr, CH, I, Is, S, ROM, SK and SLO
- 2003 – 22 participants, 2004 – 18 p., 2005 – 12 p., 2006 – 12 p; 2008 – 13 p

Course on NS for NPP subcontractors

NEPTUNO pilot course

- Organized STU Bratislava and CENS
- Overview of the concept of nuclear safety with emphasis to VVER
- May 2nd to 6th 2005
- 11 participants from B, BG, H, S, SK and SLO

Scope of course

- Understand basic terms of nuclear safety and applying them in operation
- Adopt principles of nuclear safety
- Analyze causes of accidents and events and to acquire the lessons learned
- Understand safety systems
- Improve safety culture

Compliance of Contractors with Safety Systems

ENEN - TRASNUSAFE pilot course, Nº 5

- Organized STU Bratislava for NPP contractors
- May 21st to 23rd 2014
- Venue: Energoland Mochovce NPP
- 17th participants
- Lecturers: 6 experts Spain and SR
- More: http://www.enen-assoc.org/en/training/trasnusafe-fp7.html

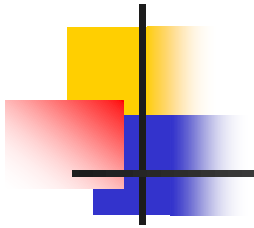
European Decommissioning Academy

- EDA 2015 focused on VVER decommissioning issue
- Organized STU Bratislava in cooperation with JAVYS and IAEA
- Overview of the decommission of VVER V230 type
- Three weeks course with evaluation
- June 7th to 26th 2015
- 15 participants from (Czech Republic, Georgia, Moldavia and Slovakia)
- Second runs under preparation for June 4th to 23rd 2017.
- More: http://kome.snus.sk/inpe/

European Decommissioning Academy (2)

Topics:

- Decommissioning according to IAEA and EC Directives
- Nuclear physics
- Radiation safety and protection
- Strategy of back-end part of nuclear energy
- Nuclear safety
- NPP decommissioning and RW management experiences
- Contamination and decontamination technologies
- Fuel cycle and spent fuel management
- Storage and disposal of RW



Thank you for your attention!

Slovak public acceptance of nuclear

According to search of public opinion agency Polis Slovakia:

- 80% are for NPP operation in Slovakia and commissioning of EMO3&4
- 60% are against V-1 Bohunice shutdown

However,

there still exist many people without trust to nuclear

- It is necessary to explain „nuclear topics" anytime and everywhere to public
- Nuclear should be comprehensible not only to specialists