
Editorial

Ulrik von Estorff

Institute for Energy,
Joint Research Centre of the European Commission,
Postbus 2,
NL 1755 ZG Petten, The Netherlands
Email: ulrik.von-estorff@ec.europa.eu

Biographical notes: Ulrik von Estorff studied Mechanical Engineering at the RWTH Aachen University (Germany) and received his Doctor's degree as well from the RWTH Aachen University in the area of reactor materials and non-destructive testing. He joined the EU's Joint Research Centre in 1989 and covered several positions in the nuclear safety field as Scientist and Project and Research Network Manager. Since 2006 he has been responsible for the nuclear knowledge preservation, consolidation and dissemination activity of the Joint Research Centre's Institute for Energy.

At the beginning of this millennium several publications from different national and international organisations (Council of the European Union, 2008; Council of the European Union, 2009; NESTet, 2008; IAEA International Conference on Knowledge Management in Nuclear Facilities, 2007; OECD/NEA, 2000; OECD/NEA, 2007) were forecasting a shortcoming regarding nuclear knowledge transfer to the next generation of nuclear experts. Also the education of new nuclear experts was observed as having a downward trend quantitatively. Now, with the renaissance of nuclear energy production, student numbers are rising again. But still, there is a gap to fill, both in terms of educating students to become nuclear engineers and passing the nuclear knowledge acquired by the experts of the first generation of nuclear reactor design.

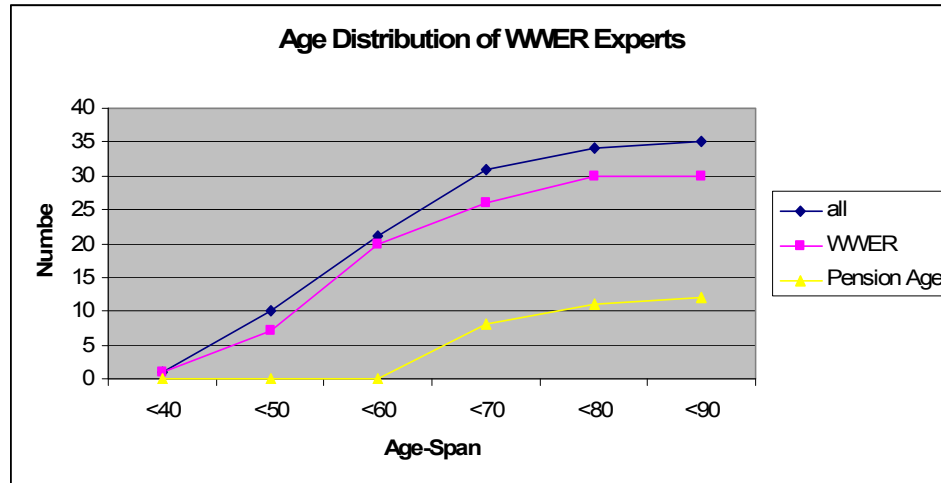
Therefore, the Institute for Energy (IE) of the European Commission's Joint Research Centre (JRC) has started in 2008, an activity related to the transfer of knowledge to the next generation. The project is named CAPTURE (Knowledge Management, Training and Education in Reactor Design and Operation) and has its own website (<http://capture.jrc.ec.europa.eu>). CAPTURE is aiming to preserve, consolidate and disseminate nuclear knowledge (von Estorff and Christ, 2009) as well as to look at possible shortcomings in the related human resource capital in the EU. This is done mainly in view of supporting the development of the next generation (GEN IV) of nuclear reactors and the lifetime extension licensing for the present nuclear reactors.

In some specific areas, the JRC's Institute for Energy has already an advanced knowledge base due to its long-lasting involvement in international nuclear safety networks. In other areas, the knowledge has to be consolidated first in order to create a digestible knowledge package for junior engineers who are going to enter the field.

This was the case for the subject of the first pilot study carried out by the JRC's Institute for Energy during the last 3 years – WWER Reactor Pressure Vessel Embrittlement.

The urgency to transfer the experience and tacit knowledge of this specific field can be clearly seen in Figure 1, which shows accumulative age figures of WWER experts from the WWER countries (squares) and from general PWR experts, with WWER knowledge not from WWER countries (diamonds). Additionally, the numbers of experts who have reached retirement age are given in a cumulative way (triangles).

Figure 1 Accumulative age figures for WWER experts (see online version for colours)



An in-house developed dedicated methodology for consolidation of knowledge involving senior experts was applied (<http://capture.jrc.ec.europa.eu/publications/pubs.html>), the description and the result of which were presented in the last issue (Vol. 4, No. 4) of the *International Journal of Nuclear Knowledge Management*.

The final aim is to come up with consolidated knowledge disseminated at different degrees of detail.

There will be CAPTURE training days, e.g. at the Joint IAEA *JRC Technical Meeting on Irradiation Embrittlement and Life Management of Reactor Pressure Vessels in Nuclear Power Plants* in Znojmo (CZ), 18–22 October 2010, which will contain six lectures explaining the basics of WWER RPV Embrittlement to ‘last-year’ students of nuclear engineering.

There will be a series of ten Multimedia Modules, developed jointly with the IAEA, introducing the key questions, answers and open issues for an engineer who is going to work in the area of WWER RPV embrittlement. The first module is online on the CAPTURE website.

There is this special issue of the *IJNKM* regarding WWER RPV embrittlement, where the consolidated knowledge is presented as scientific reviews in the different sub-areas, also mentioning open issues and giving the relevant literature references.

Finally, the three Consolidation Workshop Summaries are published as an EUR report on the CAPTURE website (<http://capture.jrc.ec.europa.eu/publications/pubs.html>). The nuclear engineer interested in detailed scientific detail can trace here summaries and references from a database of more than 600 articles in relation to WWER RPV embrittlement.

This way of consolidation can be applied to any other area of knowledge, which should urgently be done in order to pass it to next generations.

A spin-off activity for the JRC's Institute for Energy from this consolidation of knowledge is the monitoring of the 'production' and 'need' of human resources in the nuclear energy sector as a solution for a future timely alert. It will anticipate future gaps in expert knowledge. This was proposed in the sub-group on Education and Training of the European Nuclear Energy Forum (ENEF, 2007).

The JRC's Institute for Energy has taken this activity on board and is acting as operating agent of the newly created European Human Resource Observatory in the Nuclear Energy Sector (EHRO-N), which is in its first year of implementation in 2010 (von Estorff and Simonovska, 2010). It is receiving technical advice from an internationally composed Senior Advisory Group of very experienced key persons involved in nuclear engineering and human resource trends in one way or another, i.e. from the academic or the employer's side. A first status report is expected in early 2011.

This activity goes hand-in-hand with other initiatives from international organisations, such as the International Atomic Energy Agency (IAEA), the European Commission (EC) and the Nuclear Energy Agency (NEA).

References

- Council of the European Union (2008) *Draft Conclusion on the Need for Skills in the Nuclear Field: Annex*, 13 November 2008, Brussels. Available online at: <http://register.consilium.europa.eu/pdf/en/08/st15/st15406.en08.pdf>
- Council of the European Union (2009) *Council Directive Establishing a Community Framework for the Nuclear Safety of Nuclear Installations*, 23 June 2009. Available online at: <http://register.consilium.europa.eu/pdf/en/09/st10/st10667.en09.pdf>
- ENEF (2007) 'Working group "risk"', *Conference of European Nuclear Energy Forum*, 26–27 November 2007, Bratislava, Slovakia. Available online at: http://ec.europa.eu/energy/nuclear/forum/risks/risks_en.htm
- IAEA International Conference on Knowledge Management in Nuclear Facilities (2007) Available online at: <http://www.iaea.org/inisnkm/nkm/conference2007.html>
- NESTet (2008) *Nuclear Engineering Science and Technology*, 4–8 May 2008, Budapest, Hungary. Available online at: <http://www.euronuclear.org/events/nestet>
- OECD/NEA (2000) *Nuclear Education and Training: Cause for Concern?* Available online at: <http://www.oecd-neo.org/ndd/reports/2000/nea2428-education.pdf>
- OECD/NEA (2007) 5: *Statement by the NEA Steering Committee for Nuclear Energy Regarding a Government Role in Ensuring Qualified Human Resources in the Nuclear Field*, 18 October 2007.
- von Estorff, U. and Christ, T. (2009) 'Nuclear knowledge preservation and consolidation: think big and act small', *International Journal of Nuclear Knowledge Management*, Vol. 3, No. 3, pp.250–262.
- von Estorff, U. and Simonovska, V. (2010) 'Human resource trends in the European Nuclear Energy Sector: EHRO-N is watching it', *WNA Symposium*, 15–17 September 2010, London, UK.