European Nuclear Society
e-news Issue 16 April 2007

ENS NEWS, N° 16:

Intro: The art of communicating science

We live in the age of the bit and the bite, of ROM and RAM, of software and hard drive. When we are not busy downloading information, photos or music onto a CD, a DVD, a GSM, or an MP3, we are blogging or texting or surfing. Of course, every age has its own language, with its own vocabulary. Language is, after all, a living thing that is fashioned by evolving social trends and technological developments. When it stops moving you know that it's doomed. The mass of acronyms and linguistic shortcuts that we use today exemplifies how modern communications have evolved. In particular it reflects our insatiable appetite for receiving and processing ever-increasing amounts of information quickly. This need dictates that brevity, clarity and simplicity are paramount - not style, elegance or impeccable grammar. If our communications are unclear or take too long to get to the point, they are quickly disregarded - in much the same way that a time-constrained editor bins a press release that hasn't grabbed him by the throat after the first couple of sentences.

To those of us brought up on such quaint notions as grammar and punctuation, it's quite a shock to discover that to communicate successfully we need to speak a language that is rather like fast food - universally available, providing instant gratification and easily digested. Unfortunately, like some fast food, this kind of language is often more about packaging than content and nothing of real substance is communicated. Or is it?

Well, whether you are more comfortable with the Guide Michelin or the McDonalds schools of language, we all know that if we can't master the language we can't convey the message. For nuclear communicators it's rather difficult to reduce concepts like transmutation, deep geological repositories or isotope enrichment to a simple concept that anyone can understand. Of course, there's nothing new here. Science can often appear complex to non-scientists. But surely this is one area where we can and must improve if more people are to be made aware of and appreciate the many advantages of nuclear energy. At a time when the nuclear revival is in full flow, the premium on good communications is all the greater; but so too are the rewards. The anti-nuclear brigade is often very successful at using communications to influence public opinion. Of course, we shouldn't resort to exploiting common fears and misconceptions like some of our opponents do, but we can learn from them. We need to constantly upgrade our communications skills and use them to emphasise the social, economic and environmental benefits that nuclear energy brings; that's a language that everyone can understand. Frank Darwin, son of Charles, once famously said: "In science the credit goes to the man who convinces the world, not the man to whom the idea first occurs."

Ultimately it's all about results-oriented communications. There is little point in having something vitally important to say if you can't communicate it effectively. Nuclear communicators from across the world gathered in Milan from 11-15 February to focus on this and other central questions at ENS' flagship conference for nuclear communicators, PIME 2007. Scientists need to perfect the art of communications to sell science to a wider and more eclectic, information-hungry public. That's the challenge. That's the PIME message. Never before has that message been so relevant.

ENS NEWS N° 16 kicks off with a piece from our President on the Jules Horowitz Research Reactor, for which the foundation stone was recently laid in Cadarache, France. Next up is an interesting and insightful contribution from Andrew Teller on James Lovelock's seminal work *The Revenge of Gaia*.

Edition N°16 includes a bumper ENS Events section that features recent and upcoming ENS events like PIME 2007 (there's no escaping that key theme of communications), RRFM/IGORR 2007, ENC 2007 and EYGF 2007. The continuing success of these conferences reflect ENS' significant role as international conference organizer and catalyst for analysis and reflection on the key scientific issues of the day.

The Member Societies and Corporate Members section includes a number of reports and articles from France, Switzerland, Romania, Sweden and Belgium. The subjects under the scientific microscope include EDF's "NICODEME" initiative that offers research institutes – with financial help from the European Commission – contracts to carry out advanced work on nuclear safety; an award-winning doctoral thesis from a Vrije Universiteit Brussel (VUB) student on how artificial intelligence can be applied to materials testing – an area of research in which SCK-CEN in Mol (Belgium) excels; how a series of thematic seminars ("Scientific and Technical Receptions") organized by our colleagues from the Swiss Nuclear Society have helped to focus on key issues facing the nuclear science community; a drawing competition for children and young people up to the age of 18 years old organized by the Romanian Nuclear Society and a detailed analysis of the latest research into nuclear reactor control systems, which the Royal Institute of Technology (KTH) in Stockholm (Sweden) has carried out.

There is also a distinctly youthful flavour to this edition of *ENS NEWS*, with several reports from Young Generation Nuclear chapters in Spain, the UK, the Netherlands and Russia.

The recent 50th anniversary of the Euratom Treaty provides plenty of food for thought for the EU Institutions section. Our friends at FORATOM provide an in-depth analysis of the past, present and future of the Treaty and a general statement on the applicability and enduring relevance of the Treaty as it reaches the venerable age of 50.

The ENS World News section goes Down Under to feature a report on the second state-of-the-art neutron beam measuring instrument developed by ANSTO in Australia - called, appropriately enough, "Wombat." It is used on a sample of opal to assess how neutron beams penetrate and determine the material's atomic structure.

The ENS Members section completes the spring edition of ENS NEWS.
Enjoy the read and the unusually good spring weather!

Mark O'Donovan
Editor-in-Chief

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http://www.euronuclear.org/e-news/e-news-16/presidents-contribution.htm

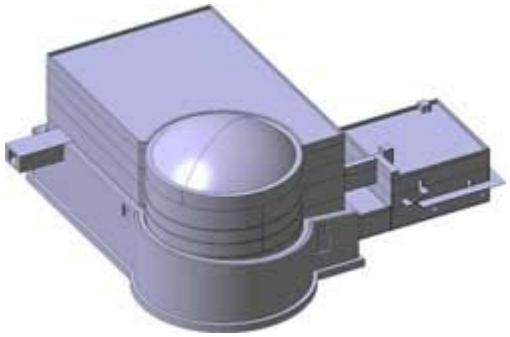
ENS NEWS

Word from the President

A major milestone for European nuclear research and development

On March 19, the first stone of the new Jules Horowitz research reactor was laid by French Industry Minister François Loos in Cadarache, France.

The Jules Horowitz reactor (JHR) is designed to be a highly versatile 100 MW thermal materials testing reactor. Operation is planned to start up in 2014, at which time it will progressively replace the Osiris reactor as well as a number of other aging European research reactors.



In his speech during the stone laying ceremony, Philippe Pradel, Director General of the CEA's Nuclear Energy Division stated that:

"The JHR will offer for a large part of this century a high performance experimental capacity for studying materials and fuel behaviour under irradiation, including:

- *Important neutron flux;*
- *The Environment relevant for different reactor technologies*
- *The Enhancement of online instrumentation*
- *A modern safety standard*

This will meet public and industrial needs for generation II, III, IV, with regards to the different reactor technologies (PWR, BWR, HTR, GFR, SFR …):

- *Operation and lifetime management for existing reactors*
- *Optimisation of generation III reactors*
- *Fuel behaviour in incidental conditions*
- *Innovative materiasl and fuel for generation IV reactors*

As an important secondary objective, JHR will contribute to radio-isotope production for medical applications by producing 25% of Europe's needs. This is a major public health stake."

The construction costs (estimated at 500 M€) will be met by a consortium of CEA (50%), Electricité de France (20%), EU research institutes (20%) and Areva (10%). Today, the participating research institutes are SCK-CEN in Belgium, NRI in the Czech Republic, CIEMAT in Spain and VTT in Finland. By the time this report goes to press, the EC is expected to have joined the consortium too.

During the ceremony, I was asked to give a short speech on behalf of the signatories and here it is:

After the famous 'Atoms for Peace' address that was given by President Eisenhower in 1953, many countries began pursuing the development of the peaceful applications of nuclear energy by building or acquiring research reactors. Consequently, most high-flux reactors now in operation in Europe are more than 45 years and are scheduled to be shutdown during the next decade. This will leave Europe with a shortage of research reactors and without even the essential tools required to carry out nuclear physics research and to develop reactor technology -

including fuel and structural materials testing etc...

The applications of fission research reactors are not limited to just generating nuclear fission power. R&D on structural materials that can withstand the extreme conditions inside fusion reactors such as ITER, innovative nuclear fuel development and radioisotope production for medical and industrial use all require irradiation sources that are provided by research reactors - optimised to suit specific applications. Does Europe want to continue play a leading role in nuclear research and development as well as on the industrial scene? If the answer is yes, then we need to develop new state-of-the-art research reactors.

Whatever the long-term role of nuclear energy in the world energy mix is, nuclear power and its bi-products will continue to be vitally important for generations to come. The non-power applications of nuclear energy will most probably remain techniques of choice in specific niche areas such as medical diagnosis and therapy, and will certainly be developed in other areas like water desalination or hydrogen production. Finally, let us not forget that even where nuclear energy is being phased out – a scenario that is favoured by some countries - the legacy of today's nuclear activities has to be managed optimally for decades to come. Let us not forget either that radiation is a natural phenomenon and has been present all around us since the beginning of time. Whatever the future of nuclear power might be, we need to retain and develop nuclear knowledge and expertise. Consequently, we need new nuclear scientists and engineers to move things forward.

Training and educating this future generation of nuclear scientists and engineers requires a special infrastructure that is adapted to meet future needs. The Jules Horowitz reactor clearly provides an extremely useful tool in promoting technological development and supporting the achieving of these educational objectives.

Today, we sign the consortium agreement for the construction of the Jules Horowitz reactor, which is named after one of your greatest nuclear scientists. Between now and when first criticality is reached, various supporting research and qualification programmes will have to be performed with regards to fuel, materials etc... I do not doubt that the genealogical roots of the Jules Horowitz reactor will lead to existing European research reactors being ready and willing to implement these supporting programmes.

In addition to the French initiators of and partners in this project - CEA, EDF, AREVA - I also see here today consortium members from Spain, Finland, the Czech Republic, Belgium and, last but not least, the European Commission. This is proof of the new scientific culture that exists today whereby scientific advances are achieved through international collaboration that benefits mankind in general, rather than simply serving local interests. As such, the signing of this agreement today is a foretaste of similar initiatives to come in the future.

The Jules Horowitz reactor will meet many of the future research needs in the field of thermal reactors. We know that the road to even more sustainable nuclear energy will involve the use of fast neutrons. There undoubtedly is a need for a major experimental European fast spectrum neutron reactor. In this context, a significant European effort is already underway and we look forward to seeing the advances that it will bring. Similarly, it would be reasonable to assume that just such an effort will help ensure the long-term availability of radioisotopes for medical and industrial use by means of a specially-designed and dedicated reactor.

France, and in particular the CEA, has well understood that in today's European context a project like the Jules Horowitz reactor has to be a European venture involving prominent European partners. I know that I express the opinion of all partners present here today when I thank you, most sincerely, for your vision and your proposal to be part of this challenging venture to which all of us are committed and which all of us look forward to seeing bear fruit. I also want to congratulate you for your organisation of this very nice ceremony. The 19th of March 2007 will certainly be remembered as a major milestone for European nuclear research and development.

Frank Deconinck
President of the ENS

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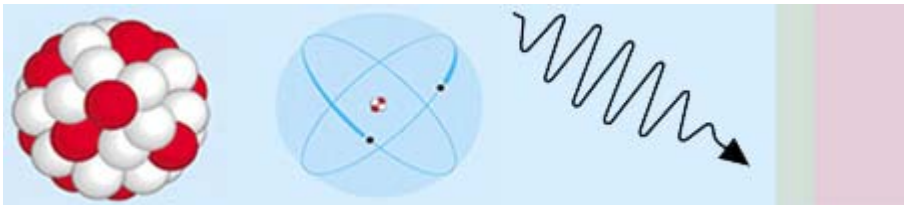
http://www.euronuclear.org/e-news/e-news-16/listening.htm

ENS NEWS

The Revenge of Gaia



by Andrew Teller

Some books have such an impact on their readers that they feel different after having read it: their outlook on life or some long-held belief has been altered irreversibly. ***The Revenge of Gaia*** is one of those. Like most people, I had heard about James Lovelock and the Gaia theory, but I had never got round to reading anything about it. James Lovelock's *Revenge of Gaia* is his latest book and, admittedly, his testament. It is nevertheless a good place to start for an introduction to his work in general and the Gaia theory in particular.

I must admit that I had always thought that all the talk about global warming was a bit overdone and that gradual changes in world climate would – in due time – lead the lazy majority to mend their ways. This was until I started reading in the above-mentioned book about how its author invented Daisyworld in an attempt to justify his view of the earth as a self-regulating organism. Daisyworld is a very simple and, therefore, imaginary planet. It is populated by only two life species: black and white daisies. The flowers are assumed to find all the nutrients and water they need. Furthermore, due to their differing colours, they reflect different quantities of sunlight and are, therefore, able to alter the temperature of the surface on which they are growing. James Lovelock and his colleague Andrew Watson went on to write all the equations describing this simple ecosystem. There are a dozen or so of them; they include energy balances and relations describing how the planet's temperature influences the flowers' growth factors. Since the sizes of the areas covered by each

species vary and reflect different quantities of sunlight, the surface temperature of the planet varies and in turn changes the growth factors of the plants, leading to a closed-loop system. It must be added that the equations describing the energy reflected and the growth factors are not linear: the radiation emitted by the daisies follows the well-known Stefan-Boltzmann law involving the fourth power of the temperature and the flowers' growth factors involve the square of the temperature. All the ingredients needed to give rise to a nonlinear system are there and a nonlinear behaviour we obtain. To use James Lovelock's own words, the system so modelled is "stable, insensitive to initial conditions and resistant to perturbation." If the model is instructed to increase the energy given off by the sun, one does indeed observe that the planet's temperature remains remarkably stable for a fairly wide range of solar luminosity. Beyond a given threshold, however, the self-regulating capacity of the system breaks down; the temperature starts rising rapidly so as to bring both species to extinction. Those who would be tempted to believe that this exercise is purely academic please be reminded that the heat emitted by the sun has been steadily increasing since it first came into being.

Being somewhat familiar with nonlinear systems, I immediately recognised this type of behaviour: relative stability for a wide range of values of the controlling parameters and then sudden departure from the former steady state once these have exceeded a certain threshold. Since I was able to connect this simple model[1] to previous knowledge, it did more than countless magazine articles to convince me that climate change is a threat not to be underestimated. It drove home the conclusion that the warnings of the climate experts might not give us much of an advance notice.

Daisyworld provides a bare bones description of the many closed-loop systems governing our ecosystem. A very important one among them concerns carbon dioxide. This explains James Lovelock's decision to advocate the use of nuclear energy which he sees, as the nuclear industry does, not as the solution but, clearly, as *part* of the solution. He considers that, if the problems of nuclear energy are certainly not to be overlooked, they are nevertheless dwarfed by those that would result from a failure to address climate change very soon and with means commensurate to the extent of the threat.

Contrary to so many others who claim to be concerned by global warming, James Lovelock has absolutely no taboo regarding nuclear energy and he makes no bones about it. It is even remarkable to see how outspoken he can be when it comes to justifying its use. By contrast, the wording he uses highlights the extent to which we members of the European Nuclear Society apply self-restraint when we speak in favour of nuclear energy. There are many other excerpts of ***The Revenge of Gaia*** worth quoting here, but this would deprive you of the pleasure of discovering them for yourselves. This is why I would rather encourage you to buy and read it[2] ; I am ready to bet that you will find yourselves recommending it to acquaintances - as I am doing today.

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[1]Feeding "Daisyworld" in an Internet search engine will lead to numerous interesting articles

[2] James Lovelock, *The Revenge of Gaia*, Allen Lane (Penguin Books), London, 2006 (176 p)

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http://www.euronuclear.org/e-news/e-news-16/pime2007.htm

ENS EVENTS

ENS PIME 2007

Nuclear community intensifies communications efforts to reach broader public and meet the information needs of the global nuclear renaissance.

From 11-15 February 2007, over 170 professional communicators from 27 countries congregated in the Palazzo delle Stelline Congress Centre in Milan, Italy, to take part in **ENS PIME 2007**. Now in its fifth year, the annual PIME (***P**ublic **I**nformation **M**aterials **E**xchange*) conference is organised by the European Nuclear Society (ENS) in co-operation with the International Atomic Energy Agency (IAEA), the Nuclear Energy Agency of the OECD (NEA/OECD) and FORATOM. PIME is an international conference that provides communicators in the global nuclear science community with a unique opportunity to discuss the key issues of the day, to focus on new communications solutions and tools and to network with their fellow professionals. Among those who took part were representatives of the major European power utilities, research centres, nuclear science associations and national nuclear associations.

At a time when concerns about security of supply, combating climate change and competitive energy prices have thrust nuclear energy to the top of the global energy agenda and stimulated the nuclear revival, the premium on effective communications is all the greater. So too are the challenges and rewards for nuclear communicators, who must communicate the social, economic and environmental advantages of nuclear energy to an increasingly information-sensitive public. This was one of the key messages to emerge from the conference.

The conference agenda consisted of a series of plenary sessions, panel discussions and parallel workshops focusing on specific communications issues.

Among the main subjects discussed during the plenary and panel sessions were the international ITER fusion project, the drivers and implications of nuclear new build in the UK, countries planning to go nuclear for the first time and the situation in the host country, Italy. The results-oriented workshops gave PIME 2007 delegates the opportunity to concentrate, in a more hands-on way, on issues like applying best practices, enhancing stakeholder consultation and communicating via the Young Generation Nuclear network. The objective was for delegates to learn about new communications skills and approaches.

Among the guest speakers at **PIME 2007** were senior representatives of the European Commission, industry specialists, journalists, communications consultants and experts in a range of fields, including public acceptance and crisis communications.

Each year during PIME the nuclear community recognises the contribution that high impact communications can make to reinforcing key messages about nuclear energy to the public by presenting the PIME Award for Communications Excellence. This year the prize went to British Energy, for its innovative and audacious Demarco Skateraw campaign that humanised the image of nuclear energy by establishing a novel link between art and science.

On the final day of the conference, delegates visited the research facilities of the European Commission's Joint Research Centre, ISPRA, which are just outside Milan.

ENS President, Frank Deconinck, who chaired the conference, emphasised how information is a prerequisite for a democratic society and how it is the role of scientists and communicators to empower the public by sharing knowledge with them: "People are the ultimate power, but power is only of common good if it is the hands of informed people. We are confronted every day with misconceptions and factual errors about nuclear energy. How can we expect the public to make an informed, objective judgement if scientists cannot effectively communicate the facts? PIME aims to enable nuclear communicators to improve their skills and develop new tools so that the public can make informed choices based on scientific fact, not fiction."

For more information about PIME 2007, consult the following web site:
www.PIME2007.org

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http://www.euronuclear.org/e-news/e-news-16/rrfm2007.htm

ENS EVENTS

RRFM IGORR 2007

RRFM / IGORR 2007 – the success of synergy!

The IGORR (International Group Operating Research Reactors) conference took place this year in Lyon, France, from 12-14 March, where it joined forces with the RRFM Conference (Research Reactor Fuel Management), to create the first ever RRFM/IGORR.

The RRFM is a well-established annual event that takes place in Europe and focuses on all questions relating to the management of fuel for research reactors.

The IGORR conference is a biannual event that brings together experts from all around the world in the field of research reactor technology. In addition to focusing on the management of research operators, IGORR also puts the debating spotlight on the design, construction and operation of new research reactor types.

The synergy between RRFM and IGORR was perfect and the two merged into one seamlessly. A total of 290 participants from 38 countries congregated in Lyon to take part in the numerous plenary and parallel sessions. Here is a summary of the main highlights of **RRFM/IGORR 2007**:

After some introductory words from the two co-chairmen – Edgar Koonen of SCK-CEN who spoke on behalf of RRFM and Joël Guidez, Chairman of IGORR and Director of the Pheonix Plant – a speech was given by the High Commissioner for Atomic Energy at the CEA (Commissariat à l'Energie), B. Bigot. Mr Bigot's speech focused on the social contribution that nuclear research reactors make in diverse areas such as medical applications, the irradiation of new materials, developing new fuels for the nuclear industry, education and training, research into the structure of mass and nano technologies and defence and space exploration technologies. One of the new reactor projects that were presented was the Jules Horowitz Reactor (JHR), which is currently under construction at Cadarache, France. The JHR is financed by a consortium of contributing countries that will benefit from first use of the results of its research programmes.

The Plenary Session on Day 1 of **RRFM/IGORR 2007** kicked off with a general overview of the status of current research reactors around the world. The impressive planning behind the Australian OPAL reactor that started operation in 2006 was one focus of attention. A presentation was also given on the JHR project and how the signing of an agreement by the consortium partners on 19 March 2007 provided a framework for an international organisation to carry out the project.

A status report on the construction, in Beijing, of the Chinese reactor, CARR, was then presented, detailing the safety profile of the reactor. The CARR reactor should be up and running in 2008. Delegates were then given an outline of the work carried out by the ILL neutron beam reactor in Grenoble, France, which is financed by 13 countries.

Next on the agenda was an appreciation of the civil applications of Libya's only research reactor, notably its use in the fields of the desalination of sea water and the development of medical radioisotopes.

Delegates' attention then switched to a presentation on the current functioning of the CEA's Pheonix reactor, in France, and of future Generation IV reactors - especially rapid sodium reactors. These developments were discussed within the context of the sustainable development debate because these reactor types multiply by 100% the use of the uranium, which in turn avoids any problem of supply and allows thousands of years of production. What's more, current research with the Pheonix reactor highlights how these reactors enable long-lived radioactive waste to be burnt with only rapidly decaying waste (a few hundred years) as the end product.

The applied research being carried into these reactors by international organisations was also discussed at length by **RRFM/IGORR 2007** participants. The IAEA, for example, presented the work done by its TWGRR (Technical Working Group on Research Reactors) team. This work facilitates the exchange of knowledge and expertise, provides technical support and helps with the elaboration of recommendations.

Participants then focused on various recent works published on the subject of the Global Threat Reduction Initiative (GTRI) and the related work carried out across the world to recuperate and render safe HEU nuclear fuel (an enrichment level of over 20%). This naturally led to a discussion on the latest work being done to convert reactors to use fuel that is enriched by up to 20% (LEU)

The agenda for the next two days of the conference consisted of a series of parallel sessions devoted to a range of specialised topics, in particular discussions about the new nuclear fuel "UMO" and neutron calculations in reactor cores. As far as the UMO fuel is concerned, delegates were reminded that for certain reactor types the conversion from HEU fuel to LEU fuel leads to an unacceptable reduction in operational efficiency and a loss of flux characteristics. This fact has in turn lead to applied research into UMO fuel, which enables greater density and reduces to a minimum what is lost during the conversion process. The development of UMO fuel has been hindered in recent years by difficulties linked essentially to the interaction between the fuel and the cladding, which has led to the bursting of the cladding during qualification tests in the reactors. Various rather empirical methods to overcome the problem of interaction are being applied (e.g. the addition of silicon to the cladding, the covering of the fuel, etc.). At present, no valid solution has been, found and research continues.

Another highlight on the programme was a presentation on the conversion of reactors, most notably the conversion to 20% silicon of the SAFARI reactor in Africa. Work on this is ongoing. The estimated loss in terms of neutron flux availability during the conversion process is around 8%.

Overall, **RRFM/IGORR 2007** was a resounding success, in keeping with the individual reputations of the RRFM and IGORR conferences.

The next RRFM conference will take place in 2008 in Hamburg, Germany. The next IGORR conference will take place in Beijing in 2009, either in conjunction with the RERTR conference or with a conference devoted to research reactors in Asia.

(Joël Guidez - CEZ)

If you need more information on **RRFM/IGORR2007** visit the ENS website at: www.rrfm2007.org

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http://www.euronuclear.org/e-news/e-news-16/enc2007.htm

ENS EVENTS

The European Nuclear Conference (ENC): Focus on cutting edge R & D

ENC2007 will take place at the VUB (Vrije Universiteit Brussel) from 16-20 September and preparations are already in full swing. Here is some updated information on this flagship biannual ENS conference organized in co-operation with the Belgian Nuclear Society (BNS), OECD/NEA and the American Nuclear Society (ANS).

ENC2007: VUB, 16-20 September 2007

Sharing knowledge and providing insight into the latest developments in nuclear R&D and its applications – that is the aim of the European Nuclear Conference 2007 (ENC2007).

Preparations for ENC2007 are in full swing, and the conference is likely to be the key event on the 2007 calendar dedicated to the subject of state-of-the-art nuclear R&D.

Programme highlights

In addition to the technical tracks on new reactor and energy technologies, aspects of the nuclear fuel cycle and of nuclear operations and medical applications, the conference will include plenary sessions that will concentrate on cross-cutting issues and the broader context. Keynote speakers and participants will discuss the following topics:

- EU research policy
- The politics of science and technology
- Business and industries' views on science and R&D policy, challenges and needs

- Science as “living knowledge”: E&T policy and knowledge management
- The human factor in risk governance: aspects of awareness and responsibility
- State-of-the-art of European research policy in nuclear and medical science and technology
- Nuclear science & society: the role of the media

Parallel workshops

ENC2007 has four topical workshops running parallel to the conference tracks:

- Education & training and knowledge management
- Safeguards and terrorism
- The politics of sustainable development
- Challenges and opportunities for nuclear professionals (ENS Young Generation workshop)

The aim of the half-day workshops is to generate debate around and promote deeper insight into the topics in question by sharing views with experienced and renowned guest speakers.

Research and industry expo

Companies can still take part in the industry exhibition, although available places are running out! In this way, ENC2007 also gives research centres the opportunity to present their activities and latest research projects to the nuclear community. Contact the secretariat through the ENC2007 website if you want to be part of the exhibition.

Gallery showcase for visual and audiovisual materials

In addition to the traditional poster displays, participants are encouraged to send in visual materials that represent the aims and content of their research work: posters, photos, DVDs, website displays and even art work. Their work will be displayed centrally in the walkways around the conference rooms. You can also send in printed material (flyers, reports, books etc.). These will be on permanent show in the ENC2007 Library Lounge, the 'chill out' room of ENC2007.

In the Library Lounge, showcase materials will be organised regularly during the conference. Participants wanting to showcase their materials should send in a short description of what they would like to exhibit to enc2007@euronuclear.org. There is no specific deadline for this, but remember that the number of available slots is limited.

Contemporary art expo

To prove you that we are really going 'crossover', the VUB will organise a contemporary exhibition on how art can inspire science and vice-versa. The official opening of the show is scheduled to take place during ENC2007.

Science café

The ENC2007 Science café will be the gathering point throughout the event. The café will be located in the basement of the conference building, where also the coffee breaks and the research exhibition will take place. Any questions and inquiries regarding any aspect of ENC2007 should be addressed to the Conference Secretariat at enc2007@euronuclear.org.

Registration opens on 2 May 2007.

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http://www.euronuclear.org/e-news/e-news-16/EYGF2007.htm

ENS EVENTS

FACING THE FUTURE
EYGN Young Generation Network

European Young Generation Forum 2007

5-10 june 2007 Amsterdam – The Netherlands

The European Young Generation Forum is organized by one of the members of the European Young Generation Network. The next forum will be held in Amsterdam and therefore organized by the Dutch Young Generation (DYG).

The EYG is a network for a new generation of professionals that has the following goals:

- Develop new approaches to communicate benefits of nuclear power, as part of a balanced energy mix.
- Promote further peaceful use of nuclear science and technology.
- Transfer knowledge form the current generation of professionals to the next generation.

The topic of the forum will be “the nuclear future”. For the opening session we have attracted well known speakers with experience in the nuclear field. During the event there will be technical presentations given by (young) professionals about the following subjects:

- Gen IV and Beyond
- Nuclear and Hydrogen
- Nuclear in a liberated energy market
- New attitudes towards nuclear
- Can we do without nuclear?

Besides these presentations the famous “Fusion road show” will be held and an interesting visit to the Nuclear Research and consultancy Group (NRG) in the dunes of the northern part of the Netherlands is planned. This excursion consists of a nuclear part and a non nuclear part, e.g. High Flux Reactor and Hydrogen laboratory.

This will be the second EYGF event after a very successful initial one in Zagreb, Croatia (2005) with approximately 80 participants from more than 15 countries. It is intended to make the EYGF a recurring event that will be held every two years. Therefore, we expect at least 100 young professionals from many European countries and other parts of the world.

Early registration before 28th April (€100), late registration before 15th May (€125), Registration is already open, see: www.eygf.org

The European Young Generation Forum Team 2007

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http://www.euronuclear.org/e-news/e-news-16/nicodeme.htm

MEMBER SOCIETIES

The NICODEME contract, a new opportunity offered to European research teams and manufacturers

EDF's Research and Development Division has decided to offer a new opportunity to European research teams and manufacturers, with the financial help of the EuropeanCommission. EDF R&D proposes access to its research infrastructure in order to carryout experimental tests for the assessment and improvement of nuclear safety.

CYPRES and CYTHERE test facilities

download description

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http://www.euronuclear.org/e-news/e-news-16/nuclear-reactor-control.htm

MEMBER SOCIETIES

A Nuclear Reactor: a Dynamic System to Control

In April 2006, twenty years after the Chernobyl accident, the public in general and the scientific community in particular were strongly reminded about the dynamic character of that type of nuclear reactors.

The neutron kinetics equations primarily determine the transient behavior of nuclear reactors. These are an inherently unstable set of equations. Their application will be presented in a MATLAB code to explain the Chernobyl power surge.

However, commonly used nuclear reactors also have stabilizing internal capabilities. These come from the nuclear fuel and the moderator. They are called the fuel temperature coefficient and the moderator temperature coefficient respectively. External control is accomplished with control rods. Inserting or withdrawing them will result in a power decrease or increase. This is illustrated with MATLAB calculations and verification, with results from a reactor in Ringhals.

At the beginning of the Swedish nuclear era in the 1960s different type of reactors were studied. Extensive simulations with an analogue computer were performed to study the inherent safety character of the planned heavy water reactor. There too the cooling medium's coefficient plays a decisive role. The chart illustrating the stable and unstable areas with the variety of the fuel temperature coefficient and the cooling

medium's reactivity coefficient will be discussed.

An analytical study with z-transform illustrating the importance of choosing the right control systems completes the seminar.

Nuclear Reactor Control

Frigyes Reisch
Automatic Control, Electrical Engineering,
KTH Royal Institute of Technology
Stockholm, Sweden
Seminar 2007 February 22

To encourage students to study the automatic control of nuclear reactors, it is useful to let them make their own computer codes instead of only using huge detailed programmes with "invisible" contents. It also proves how straightforward direct analyses without using sophisticated codes can give valuable results.

Lately I was asked by the *New Scientist* whether I was surprised that an accident with a Chernobyl type of reactor could have happened. I answered that I was not surprised at all. Now, twenty years later, it was easy to demonstrate it, as it is shown in the 2006 summer addition of *Nuclear News*. The simple equations were verified in that year's autumn edition.

However, the story started long ago, in the mid 1960s.

As part of my Ph. D. work I analyzed the dynamic behavior of a boiling heavy water reactor. As the parameters were uncertain at the design stage I had to make parameter studies and indeed, with certain parameters, a small perturbation could cause an oscillatory increase of power or a straight forward avalanche increase of the neutron flux.

The other part of my PhD work was to study a suitable control system for a multi channel reactor. The obvious method was to choose a sampled data control system.

Here too, the importance of selecting the correct control parameters to avoid instability was soon apparent.

With such a background it was easy to imagine in April 1986 what could have happened with a multi-channel boiling water reactor with a positive void coefficient.

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http://www.euronuclear.org/e-news/e-news-16/akmc.htm

Introducing the use of artificial intelligence in materials science

It is well known that nuclear reactor pressure Vessel steels (RPVS) become brittle under neutron irradiation. Copper precipitation is considered as one of the major causes of this phenomenon and is, therefore, the subject of interest of a research project started a few years ago at SCK•CEN (Research Centre for Nuclear Energy, Mol, Belgium).

An accurate prediction of the kinetics of copper precipitation in RPVS containing 0.1-0.3%Cu is important to assess the lifetime of existing nuclear power plants. The concepts developed in this project can, however, be applied to other binary alloys, such as iron-chromium, the base for high-Cr ferritic/martensitic steels. These are expected to play an important role in fusion and in new generation fission plants.

The concept of Atomistic Kinetic Monte Carlo (AKMC) simulations was introduced many years ago in scientific literature and is particularly well-suited to studying problems of solute segregation and precipitation in alloys for two major reasons. The first is that, contrary to other Monte Carlo schemes, the kinetics of the process is explicitly modeled allowing, for example, for the time required to reach a certain

average radius of copper precipitates to be predicted under a given set of experimental conditions: temperature, vacancy concentration (neutron flux), copper concentration… The second is that the process is modeled at the atomic level, i.e. by explicitly accounting for the fundamental physical mechanism of solute diffusion in alloys. The approach used in this project has an additional advantage: the only required input is a reliable inter-atomic potential for the alloy interesting question. In the present case such a potential had been constructed to fit a number of key features of the Fe-Cu system, in particular the experimental copper solubility limit in iron.

At the moment, AKMC methods are limited to relatively small simulation boxes, containing less than 1 million atoms. Moreover, a rigid bcc crystallographic lattice is imposed, and the presence of interstitials is not yet taken into consideration. However, the main drawback of AKMC simulations is that they require the evaluation of defect migration energies at each steps of the calculation. This energy is a complex function of the local atomic configuration (LAC). It can be accurately calculated, without any simplification, with the aid of molecular dynamics (MD). MD techniques are however extremely computational time costly, making their systematic use in the course of an AKMC simulation totally impossible to envisage.

In this project it is proposed to replace the use of MD techniques by a fast artificial neural network (ANN). The objective was, accordingly, to construct a fast, optimized energy barrier calculation system composed of the ANN program, a fuzzy logic (FL) system to feedback its predictions and a data base module that records every MD calculation done.

A software coupling the ANN-FL-MD-Tables modules has been developed and prepared to be used with the LAKIMOKA software (the AKMC code developed by EdF, France). The concept of evolutionary strategy, allowing the MD calculations to be focused on the most problematic LAC's, has been defined and proposed as a future guideline to treat the real problem of copper precipitation in iron under neutron irradiation.

Applications to the study of copper precipitation in iron under thermal ageing, with the presence of one single vacancy in the simulation box, have been performed to study the evolution with temperature of the copper solubility limit in iron. Although no fully satisfactory correlation with experimental measurements has been obtained so far, the results are however highly encouraging, because it has been shown that they are consistent with reference equilibrium conditions previously reached with other Monte Carlo simulations. On the basis of these studies, guidelines to achieve better compatibility with experimental data in future simulations could, therefore, be identified.

The originality of this project resides in the use of advanced computational tools in material sciences: an ANN is used as a correlation function to avoid the use of a costly but accurate technique and a genetic algorithm is used to prepare a fuzzy logic system to feedback the ANN predictions and, thus, improve the system's performance. The project is, consequently, the application of known modern tools to solve a problem never addressed before with their use, or, conversely, it is the development of a new method to solve a well-known but not yet completely solved problem. The ultimate goal of this field of research is to simulate years of irradiation under large neutron fluxes. The use of artificial intelligence is an elegant and very promising tool for this purpose.

The project is led by Dr. L. Malerba, with the collaboration of Dr. R. Domingos and

Dr. F. Djurabekova. It has been the subject of a Masters thesis presented by N. Castin for the degree of Master of Sciences in Nuclear Engineering (Belgian Nuclear higher Education Network, BNEN), which has been awarded by SCK•CEN the title of "the best university thesis for the academic year 2005-2006."

Editor's note: N. Castin has recently also received recognition from the Belgian Nuclear Society as the "Best nuclear science university thesis for 2006."

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http://www.euronuclear.org/e-news/e-news-16/sns.htm

MEMBER SOCIETIES

Swiss Nuclear Society (SNS)

Scientific and Technical Receptions are a great success (Wissenschafts-Apéro).

Since July 2005, the Swiss Nuclear Society (SNS) has organized, every two months, special "Scientific and Technical Receptions" devoted to themes related to nuclear energy.

These SNS Receptions are held in the late afternoon and are conceived as thematic seminars, preceded and followed by a reception. The participants have the chance to socialise with the seminar guest speaker and ask him/her questions in an informal and stimulating atmosphere.

The SNS Receptions attract participants from both inside and outside the nuclear field. The professional background of the participants ranges from industry representatives, regulatory bodies and research institutes to academic centers and politicians.

The SNS Receptions are public and participants do not have to pay an attendance fee. The topics chosen are done so in such a way as to provide alternatively scientifically or technically-oriented information.

Recent scientifically-oriented receptions have focused, for example, on subjects like “Research on Materials for High Temperature Gas Reactor Application” (Speaker: Dr. Wolfgang Hoffelner from the Paul Scherrer Institut) and “Fusion and Iter” (Speaker: Prof. Ambrogio Fasoli from Ecole Polytechnique Fédérale de Lausanne). The next one will be held on May 8, 2007 in Baden and the topic under discussion will be “The Use of Best Estimate System Codes in Nuclear Safety Applications for Nuclear Power Plants” (Speaker: Prof. Rafael Macian-Juan from the Technical University of Munich).

Regarding the technically-oriented receptions, a series of discussions is currently in progress devoted to Generation III nuclear reactors. In this context, subjects like the “European Pressurized Reactor (EPR)” (Speaker: Mr. Wolfgang Storr from Areva NP GmbH) and the “Westinghouse AP1000 Reactor” (Speaker: Mr. Bernd Doehnert from Westinghouse) have already been covered. These will be followed in the near future by a discussion on the SWR1000 (Areva) and on other Generation III type reactors.

A list of the Scientific and Technical Receptions held so far, including the slides of the presentations, is available online at
www.sns-online.ch/

The Swiss Nuclear Society has had excellent exresults with these Scientific and Technical Receptions and suggests that other member societies of the European Nuclear Society also consider the possibility of using a similar method of providing interesting information related to nuclear energy.

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http://www.euronuclear.org/e-news/e-news-16/safpwr.htm

MEMBER SOCIETIES

SAFPWR web site

ENS NEWS would like to draw ENS members' attention to the following information regarding a project developed by Michel Mélice, a fellow ENS member. It is available at the following web address:
www.safpwr.be

The information relates to the development of a website dedicated to the SAFPWR, a "PC-based Tutorial for Analysing Nuclear Pressurised Water Reactor Transients and Safety" that Michel Mélice has developed himself.

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http://www.euronuclear.org/e-news/e-news-16/contest.htm

MEMBER SOCIETIES

ROMANIAN "NUCLEAR ENERGY" ASSOCIATION

ROMATOM FORUMUL ATOMIC ROMAN

International Symposium on Nuclear Energy - SIEN2007

Best Western Park Hotel, Bucharest, Romania
October14 - 19, 2007

“Nuclear Power A New Challenge”

SIEN'07 is an international symposium organized by the Romanian Energy Association - AREN and the Romanian Atomic Forum - ROMATOM.

The objective of the symposium is to debate the role and the challenges of nuclear energy in the context of the new enlarged European Union.

All the experts and representatives of the main organizations and institutions

involved in the development of nuclear projects and implementation of National Power Programmes have been invited to participate in the symposium.

SIEN'07 is also open to research officers and students interested in the scientific application of nuclear energy and related issues.

Session Topics:

• Developing new nuclear technologies
• Operation, inspection and maintenance
• Increasing nuclear safety features
• Fuel cycle and waste management
• Public acceptance and confidence strengthening

Workshops:

•QA management within the European integration
• YoungGeneration: “Building the Future”
• WIN and developing EU nuclear programmes
• The diversity of nuclear power in EU

Poster conference sections
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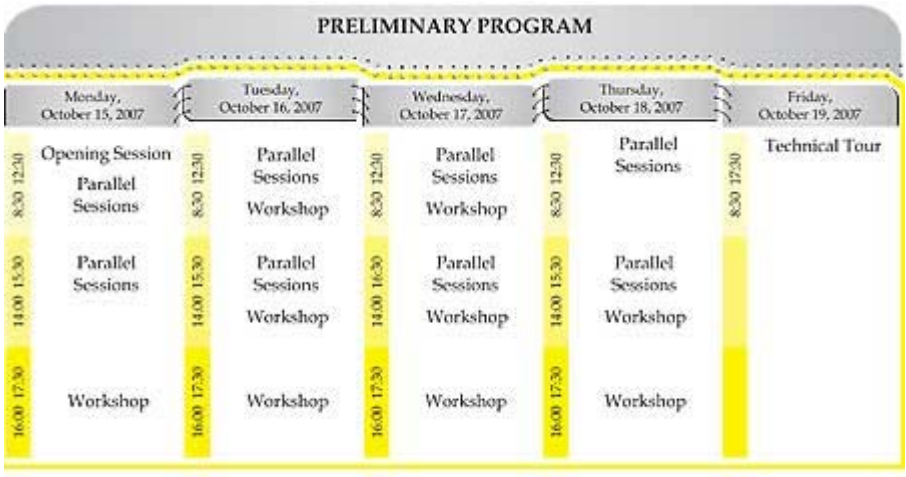
Programme format:
Sunday, October 14 2007: Registration and Welcome Reception
From Monday to Thursday, October 15-18, 2007: Technical Sessions, Posters and Workshops
Wednesday, October 17, 2007: Gala Dinner
Friday, October 19, 2007: Technical Tour



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For details of abstract or manuscript templates, the registration form and accommodation go to www.aren.ro

KEYDATES: DEADLINES FOR AUTHORS

Mail your abstract before May 1 2007
• May 1 2007: Abstract Submission
• June 1 2007: Notification of acceptance
• August 15 2007: Second announcement
• September 15 2007: Reception of full papers

Registration Fees:

Participants	Before 1 September, 2007	After 1 September, 2007
EMS Member & supporting member	350 EUR	400 EUR
Eastern/Central European countries	250 EUR	300 EUR
WIN, YG Member	175 EUR	200 EUR
Other participants	500 EUR	550 EUR

The registration fee covers:

- For participants: the symposium proceedings, attendance at all sessions, refreshments, lunches, the Welcome Reception and the Farewell Reception.
- For accompanying persons: attendance at important events and the social programme.

Methods of payment: Bank transfer or cash at registration desk
Bank Accounts: Banca Romana de Dezvoltare - Sucursala Titan:
AREN Account No:
RO75 BRDE 441 SV14227074410 for EUR
RO12 BRDE 441 SV14387414410 for USD
RO88 BRDE 441 SV15195844410 for ROL
No refund will be given after October 1st 2007 but substitute delegates will be welcomed. Undergraduate students may attend the lectures without any charge.

Additional information

- Oral presentations are limited to 15 minutes. Authors are kindly asked to present their papers in no more than 10 minutes to allow 5 minutes for discussion
- Overhead projectors will be available. For computer and video projectors please contact the organizers
- The abstracts of all accepted papers will be printed in Proceedings will be published by AREN before the Symposium.

- The full papers accepted will be copied on to CD-ROMs that will be distributed to participants at the registration desk.

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http://www.euronuclear.org/e-news/e-news-16/contest.htm

MEMBER SOCIETIES

THE ROMANIAN ASSOCIATION "ENERGIA NUCLEARA"

organizes
A Drawing Competition
(13th Edition)

The proposed topics:

"WHAT DO WE KNOW ABOUT ENERGY"
"THE ATOM – OUR FRIEND"
"NUCLEAR ENERGY SAVES THE ENVIRONMENT"
"THE ENERGY OF THE NEXT MILLENIUM"

More prizes will be awarded. All drawings will be exhibited at touring exhibitions.

Rules:

- children born after 01.01.1989 can participate;
- the prizes will be awarded according to age group:
  under 8 years old, 8-11 years old, 12 -14 years old and 15-18 years old
- The drawings can be made on paper, canvas or textiles - the maximum allowed paper size is A3 - using the following technicques: oil, aquarelles, acrylic paint, ink pens, coloured pencils, pastels/crayons.
- The drawings will be named according to the above-mentioned topics and will be accompanied by a sealed envelope with the same title. The envelope will contain the child's surname and first name, address and phone number; date of birth/age; the name, address and phone number of his/her school; the person who can provide information about that specific school (teacher, form master, etc.).
- The drawings must be in compliance with the above-mentioned topics.
- The drawings must be sent by the 25th May 2007 to the following address:

Societatea Nationala “Nuclearelectrica” SA:
65 Polona Street, sector 1,
Bucharest, Romania Attn.
Mrs. Mihaela Stiopol.

For further information please contact:
Mihaela Stiopol: mstiopol@nuclearelectrica.ro
Lavinia Rizea: Rizea_lav@yahoo.com

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http://www.euronuclear.org/e-news/e-news-16/swiss-autumn-seminar.htm

MEMBER SOCIETIES

SGK
SOSIN
SNS

Schweizerische Gesellschaft der Kernfachleute
Société Suisse des Ingénieurs Nucléaires
Swiss Nuclear Society

Resumé of Swiss Nuclear Society´s Autumn Seminar, 2006

by Dr. Peter Leister, Vice-President of the Swiss Nuclear Society and of the European Nuclear Society

Would it be profitable for Switzerland to enter into the hydrogen economy?

The seminar’s focus was on the substitution of fossil fuel based energy for heating purposes using hydrogen as the energy carrier. Bearing in mind that the seminar took place last autumn, to publish a resumé now – when the two parts of the UN Climate Change reports were only recently released – re-enforces the seminar's original focus. Political and economical aspects like independence from imports and stability of fuel prices coincide very much with the requirements for environment protection and the inevitable obligation to reduce CO_2 emissions anywhere in the world, even in Switzerland.

This country imported, in 2005, 610 PJ of fossil energy for heating, 503 PJ of which came from oil and 107 PJ from natural gas .

Issues such as the building blocks of the hydrogen technologies required to replace this amount of fossil fuel, their availability and reliability were addressed by the different presentations during the seminar.

The authors of the contributions to this seminar represent a reservoir of international know-how of the hydrogen economy in view of H_2 production by conventional and advanced processes (Linde, General Atomics, Le Commissariat à l'Energie Atomique). Some represent utilities already operating successfully stationary fuel

cells (EnBW) or research institutions participating in the international Generation IV Initiative Forum (GIF). The GIF is driving forward high temperature reactor technology towards its successful application as a heat source for H_2 production or for desalination (Paul Scherrer Institute) or for use by an international engineering company at any kind of power generation plant (Colenco).

Most of the presentations were given in German but several were in English. Access to all of the contributions is possible via the home page of the Swiss Nuclear Society at:
www.sns-online.ch/fs2007.

The lectures presented in the seminar followed a logical sequence starting with an overview over the current Swiss energy balance, a definition of the building blocks of a hydrogen economy, its requirements and constraints and progressing to a view of what Switzerland has contributed to the further development of modern hydrogen technologies. Moreover, experiences obtained with an initial industrial-scale application were described. A major part of the seminar was dedicated to high temperature processes for hydrogen production and the corresponding heat sources via the high temperature nuclear gas cooled reactors, its further development and programmes for improving materials were dicussed. Last but not least, cost calculations for building up a hydrogen economy in the transport sector, as well as for stationary purposes, were presented.

A. Böhner presented data on Swiss [presentation 1] energy consumption and production based on how the various energy carriers in the different consumption areas offer potential for being replaced by hydrogen and what would be an acceptable technological scenario for using centrally-generated hydrogen to replace imported fossil fuel especially, natural gas for heating Swiss households, public buildings and heat consuming industrial processes. He presented a strategy for the installation of a hydrogen economy and identified its risks and merits. The results of his economical calculations are mentioned at the end of this resumé.

P. Dietrich then explained [presentation 2] which Swiss know-how is available and applicable to a hydrogen economy scenario based on fuel cells. Various Swiss institutions are involved in the further development of components for conventional solar energy based H_2 production, for mobile and stationary fuel cell technology and for H_2 storage technologies. For example, Swiss PSI and Material Research EMPA co-operate in the area of metal hydrate storages for hydrogen - a very promising technology. When it comes to an industrial-scale demonstration for mobile applications this technology has already been used for snow track vehicles and for the Michelin/PSI HYLIGHT-Car®. Predictions about when the industrial application of large-scale stationary metal hydrate storages is likely to be on stream range from a period of between 10 to 15 years.

An overview of how state-of-the-art stationary fuel cells can supply apartment buildings, hospitals, etc. by simultaneously producing power and heat production on an industrial scale was presented by **B. Heyder** in presentation 3. He emphasised that this kind of technology is a mature one based on natural gas being fed into the fuel cells. If hydrogen could be switched over to immediately, its greater efficiency would be clear for all to see.

R. Schiffbauer dedicated presentation 4 to state-of-the-art industrial hydrogen production, pointing out that hydrogen production is a very traditional industry that

has worked profitably for more than 100 years. To date, hydrogen is not so much used as an energy carrier but more as a raw material for chemical processes like steam reforming. Furthermore, the distribution of hydrogen via pipelines has proven to be a very safe technology for many decades since the last third of the 19th century, when the gas mains of larger cities distributed gas to households that contained a hydrogen content of more than 50%. For more than 40 years pipelines conveying pure hydrogen have been maintained very safely in European industrial centres like the Ruhr and the area around Lille, France. These pipelines are several hundred kilometers long. Even today existing natural gas pipelines can be converted to hydrogen distribution without much of an effort. Indeed, the transition from pure natural gas to hydrogen operation would not create major technical problems. Introducing a hydrogen economy would hence not require gas and hydrogen pipelines in parallel during a transitional period.

Hydrogen production by steam reforming of hydrocarbons from natural gas has largely replaced the old electrolysis process (world wide this now only accounts for 1% of total H_2 production). Now, however, it is no longer conceivable to use old electrolysis or the steam reforming technology in a hydrogen economy. Swiss experts are of the opinion that renewable energies will never meet the requirements of economical hydrogen production.

L. Brown underlined, in presentation 5, how the only reliable and ecological – hence sustainable - hydrogen production is via nuclear high temperature reactors (HTR) combined with a high temperature chemical process (the sulphur-iodine process) This process, developed by General Atomics, was finally selected amongst 370 H_2-generating chemical processes. The feature of this process is the use of inorganic chemicals only (Iodine and Sulphur) and water as the feeding material, to produce H_2 and O_2. Depending on its chemical effectiveness losses of iodine have to be compensated for. The selection of suitable corrosion-resistant vessel and pipe materials make the equipment expensive.

This High Temperature Water Splitting process absorbs most of the reactor's fission heat and has the potential to achieve up to 70 % efficiency. The total efficiency of the chain of hydrogen production, distribution and conversion of fuel cells into power and heat is comparable to that of modern natural gas burning co-generation or district heating plants. It has the advantage of zero consumption of fossil resources and does not emit climate change-inducing carbon dioxide. The fundamental viability of this water splitting process will be demonstrated by 2010 and in 2020 an industrial scale engineering demonstration plant on will be operational.

State-of-the-art HTR technology, its international development and the time required for further materials research was covered by presentations 6 and 7. Presentation 8 was dedicated to cost considerations of the several building blocks needed to support the hydrogen economy in a small but well-industrialized country like Switzerland and in a larger industrialised nation like France.

In presentation 6, **K. Foscolos** gave a short overview of recent developments in reactor technologies and presented in detail HTRs - both existing ones (Generation IV) and future ones like improved HTRs called "VHTRs." The latter will produce fission heat at a level of up to 900° centigrade. Switzerland is an active member of the GIF, in which the most important nations contributing to this research co-operate with each other.

The experts believe that the full potential of these reactors must be exploited so that they can become the work horses of a hydrogen economy. Light water reactors will play a minor role in such a scenario. As far as the availability of uranium as a main fuel resource is concerned it is concluded that – in contrast to the declarations made by "anti nukes" – by using the advanced VHTRs uranium becomes nearly inexhaustible since uranium can be extracted cost effectively from sea water by using heat from VHTRs. Such a process makes uranium in sea water exploitable.

One important step towards the operation of VHTRs concerns the selection of materials for reactor components, which must be resistant to very high temperatures. According to **W. Hofelner** [in presentation 7] at least 15 years of further development are required to make VHTRs available on an industrial scale within 25 years.

F. Werkoff devoted his lecture [presentation 8] to economic calculations of the investment costs for the H_2 economy and presented helpful formulae. In addition, he explained the High Temperature Electrolysis (THE) process working during the vapour phase of water. This new process has, above all, the potential to compete with the S/I process but with the advantage that THE can be used with heat sources like conventional biomass, domestic incinerators and even light water reactors to produce hydrogen. For France it was calculated that within the next 45 years 85 % of the French car and truck fleet could be converted to using H_2 fuel cells requiring 16 light water reactors of the type EPR instead of 75 HTRs. When it comes to using LWRs in a hydrogen economy, the CEA obviously differs from the HTR-community.

This precise and detailed information lead the authors of presentation 1 to the conclusion that with respect to the different building blocks needed to support a hydrogen economy only two blocks determine the critical path of a solution tailor-made for Switzerland:

- cheap, large scale H_2 storages based on metal hydrates
- suitable, corrosion-resistant materials for VHTRs

The corresponding time span of 15 years would enable the start-up of a 20 year demonstration project aimed at achieving a smooth transition from imported natural gas to hydrogen. Such a project would comprise of the following steps:

- Installation of stationary fuel cells into every newly constructed apartment building with more than 10 flats for a period of 20 years
- Connection of fuel cells to the electricity grid for feeding generated power into the grid
- Construction of local H_2-gas grid sections
- Supply of fuel cells first by natural gas and later on by conventionally produced H_2 supplied by tanker lorries
- Successive construction of H_2-storage tanks at strategic points of the gas grid (according to the progress with the availability of metal-hydrate storages)

- Start of the design and construction of one HTR- H_2 production plant, comprising of two 600 ME reactor blocks
- Adaptation of existing gas grid to increase H_2-concentration
- Connect H_2-plant to gas grid
- Increase H_2-content of gas grid to 100 %

This sequence of steps corresponds to the illustration in Fig.1, starting with the part on the right hand side (stationary fuel cells, initial supply of FC by natural gas from public grid then mobile H_2-transportation, installation of H_2-storages and finally realisation of a HTR & H_2-generation plant, lefthand side)

This sequence of steps would:

- enable Swiss small and medium sized enterprises to be prepared for switching over to an H_2 infrastructure
- make consumers and suppliers acquainted with use of H_2
- enable reimbursement of fuel cell produced electricity fed to the grid
- allow for the correction of any project that shows misleading results
- give the utilities time to master the decentralized production of electricity by the fuel cells

After a successful demonstration of the feasibility of this small part of a hydrogen economy in Switzerland another 15 years period should be sufficient to extend the hydrogen economy to cover the whole of Switzerland. The calculation on an investors level show that within this demonstration project, starting with conventionally produced H_2, total operational cost of this part of a Swiss Hydrogen Economy is significantly below the operational cost of the equivalent gas/oil burning for the apartment houses (gas/oil prices exceed .095 US$/kWh and .0702US$/kWh respectively). The question raised in the seminar's title can now clearly be answered.

Moreover, the reduction of the CO_2 emissions by the demonstration project corresponds to 34 % of consumption of gas and oil fuel used for heating so far. It is about three times the amount of the energy forecast to be produced in Switzerland in 2035 by renewable energy. If all Swiss gas and oil consumption for heat production were to be replaced by hydrogen Switzerland could contribute fighting climate change and be a model for other industrial nations to follow. The technologies exist and are available. In a hydrogen economy the savings obtained from constant energy prices would be considerable.

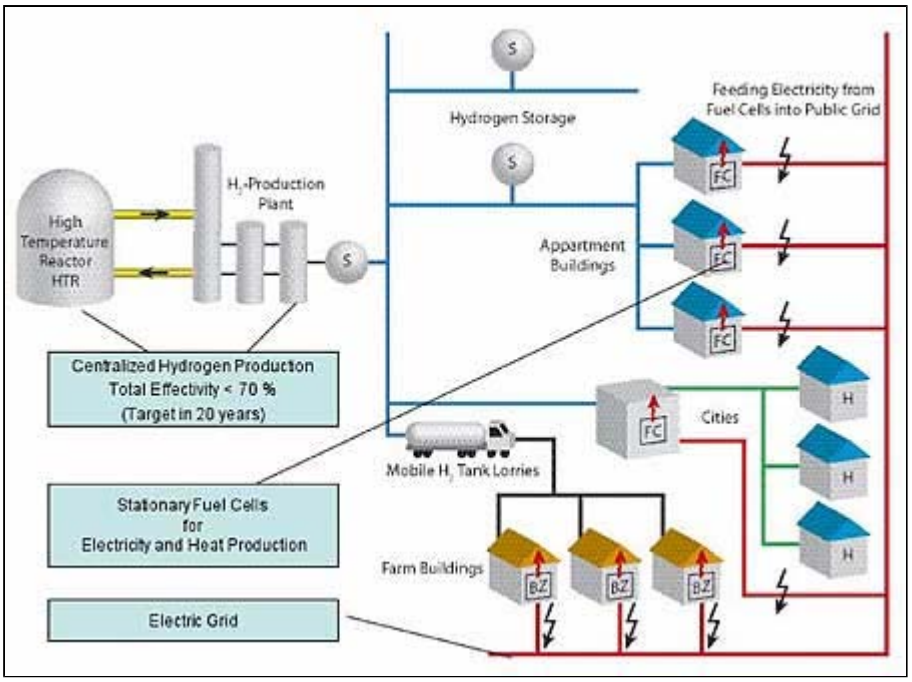

Fig. 1 Concept of a Demonstration Project for replacing fossil fuel by hydrogen and fuel cells to heat private and public houses (source Nuclear News, September 2001)

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http://www.euronuclear.org/e-news/e-news-16/ygn-spain.htm

MEMBER SOCIETIES

First encounter with young political organizations in Salamanca

On 24 October the Governing Board of **Jóvenes Nucleares (JJNN)**, the Spanish Nuclear Young Generation chapter (www.jovenesnucleares.org), organised in Salamanca the first-ever encounter with young political organizations. The event took place in conjunction with the TopFuel 2006 international conference. Sylvia Choithramani (President of JJNN), Jose Luis Perez (Vice-President), Francisco Alvarez (Director of Communications) and Manuel Fernandez (Webmaster for the JJNN website) had the pleasure of meeting three members of the Socialist Youths of Salamanca: Noelia Sanchez (General Secretary), Sara Gomez (Institutional Secretary) and Carlos Sanchez (Secretary of Organization).

Following the presentations and the descriptions of both organizations, the members of Socialist Youths portrayed their work in all the areas affecting young people: employment, housing, education, the environment, equal opportunities and the improvement of public services. The organisation is made up of young people between 14 and 30 years who are affiliated to the Spanish Socialist Party - its history and its objectives. And yet they operate independently.

The Spanish Nuclear Young Generation explained that their objectives are basically to spread knowledge on nuclear energy that shows the positive roll that this source of energy can play for the well-being of society, to encourage communication and debate and to facilitate the incorporation of professional young people in the field. Consequently, it became clear that the Spanish Nuclear Young Generation is not a pressure lobby group but is instead primarily concerned with gathering and communicating scientific and technical information with the aim of improving people's understanding of nuclear energy, and in such a way that is independent of any political inclinations or affiliation when it comes to nuclear energy policy.

Regarding the energy debate, and more precisely its nuclear component, the members of Socialist Youths showed a great awareness of the complexity of Spanish and European energy supply problems, of the advantages and disadvantages of the different energy sources and of certain rejections of nuclear energy that are mainly due to the perception that there is no final solutions to large-scale nuclear waste management. On the other hand, the Spanish Nuclear Young Generation tried to clarify technical doubts and explain that both history and current context reveal that energy needs and supply forecasting are fundamentally important considerations for the development of countries today and, therefore, it should be seen as a European priority issue rather than as a domestic issue subject to political demarcation.

Furthermore, regarding radioactive waste, firstly, the Spanish Nuclear Young Generation claimed that they are convinced that science and technology will solve every remaining aspect of waste management in the short term and in a satisfactory way.

Secondly, The Spanish Nuclear Young Generation argued that while the nuclear industry has controlled, confined and isolated each gramme of its waste in a safe way, and a huge R&D effort is being carried out in order to find better solutions, fossil energy sources (coal, gas, petroleum), on the other hand, have contributed to one of the most important problems in the history of mankind: global warming.

It was an extraordinarily interesting, fruitful and pleasant meeting. Both groups showed their willingness to continue engaging in dialogue, and it was proved that youth is something that brings people together very successfully. This implies similarity in the way that both associations are free to pursue their respective objectives. Finally, the Spanish Nuclear Young Generation chapter was invited to organise a conference for all the affiliated Salamanca Socialist Youths members.

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http://www.euronuclear.org/e-news/e-news-16/ygn-bnes.htm

MEMBER SOCIETIES

ygn young generation network (part of the british nuclear energy society)

YGN BNES activities

Rough Guide to the Nuclear Industry 2006: Sellafield, UK, 11 -13 October.

The 2006 BNES YGN Rough Guide to the Nuclear Industry was an event which brought together more than 30 young professional BNES members from a varied cross-section of the nuclear industry. The organisations represented by the delegates included those involved in nuclear power generation, submarine development and decommissioning, waste retrieval and disposal, general nuclear legacy decommissioning and industry regulation.

The Event took place at the Sellafield Visitors Centre in West Cumbria. It provided attendees with an excellent chance to broaden their knowledge of the nuclear industry as a whole, both through interaction and discussions with other delegates of varying backgrounds attending the event, as well as through the wide range of topics discussed in the various presentations. The visits to the Sellafield site which were undertaken also provided an invaluable opportunity to see some of the operations and theory that had been outlined in the preceding presentations, put into practice.

The event was opened with a 'Welcome to Sellafield' presentation by Peter Lutwyche which provided a brief history of Sellafield as well as outlining some interesting facts and figures on the current operations and future plans for the site. This was followed by an Introduction to the Nuclear Fuel Cycle given by Neil Blundell from the Nuclear Installations Inspectorate (NII). Together, these opening presentations provided a strong foundation for what was to follow and were well received, especially by those delegates with less experience in these particular areas.

Following these introductory sessions, Neil Blundell continued by providing an insight into the work and workings of the NII. This included a brief history of the regulatory body as well as an overview of the areas impacted by the NII and the kind of day to day tasks which are carried out by inspectors working for the organisation.

The afternoon of Day 1 began with a presentation on how the formation of the Nuclear Decommissioning Authority (NDA) has affected the decommissioning and clean-up sectors of the industry, in particular with respect to short and long term strategy planning. This was closely followed by a brief synopsis of the work of the British Nuclear Energy Society's Young Generation Network (YGN), the organisation responsible for putting on the conference, given by YGN Vice-Chair, Neil Crewdson.

The first day closed with two presentations on widely varying subjects, showcasing the diversity of topics this event was designed to cover. The first of these was a fascinating and frank discussion on the problem of the long-term management of radioactive waste given by Nirex, advisors to the UK government on this subject. The second was a talk on the manufacture and use of industrial sources of radiation, provided by Duncan Aston of High Technology Sources Ltd.

Day 1 ended with a meal attended by all the delegates, as well as other members of the YGN, which afforded a valuable chance for conversation and networking between delegates from different companies and areas of the industry.

The first two lectures on Day 2 were largely based around the theme of decommissioning. The first of these was given by Andy Scargill, Sellafield Superintendent for Decommissioning, and presented an overview of the challenges faced at Sellafield and some of the solutions which have been utilised to overcome them. Emphasis was then placed on the afternoons visit to the Calder Hall site with a presentation from site manager Paul Brennan on its past, present and future.

The morning was rounded off by a talk from the present CEO of British Nuclear Group, Lawrie Haynes, which was a very positive look at how innovation will be key to the future of the nuclear industry and, hence, how young people coming into the sector are of paramount importance in shaping its future.

The afternoon then consisted of two site visits. The first of these, a visit to the Calder Works including the Calder Reactor and Turbine Hall, tied in with the mornings

corresponding presentation and gave a unique insight into the life cycle of a nuclear plant through construction to commissioning, decommissioning and finally demolition. The second visit of the afternoon was a very informative overview of the Thermal Oxide Reprocessing Plant (Thorp). This gave a detailed summary of all Thorp reprocessing operations, taking in everything from receipt and storage through to the chemical separation part of the process.

The final day began with Steve Bostock, Head of Magnox Reprocessing Operations, explaining the process and plant interdependencies of the Sellafield Magnesium Oxide reprocessing cycle. This edifying lecture served as an excellent preface to the site visits which followed. These incorporated tours of the Fuel Handling Plant, where spent fuel from nuclear reactors across the country is received and prepared for reprocessing; the Separation Area, where the re-usable Uranium and Plutonium from spent fuel are separated from other fission products; and the Magnox Encapsulation Plant (MEP), where fuel cladding materials are encapsulated in grout and safely stored. Overall the days visits demonstrated how several different plants can link together to form one process as well as the reliance of each individual plant on the performance of others within that process chain.

The whole event was brought to a close on the final afternoon by two further presentations. The first came from the Nuclear Industry Association, the trade association and information body for the UK civil nuclear industry. This was followed by a fitting closing discussion and Q&A session on corporate social responsibility in the nuclear industry, led by David Bonser, BNFL Director.

The event more than achieved its initial aims of providing a broad impression of the industry as a whole, whilst also giving a more in-depth analysis of certain aspects of the exciting challenges and opportunities which exist within the industry both presently and looking to the future.

There was a diverse mix of backgrounds and experience in the group of attendees present and it was testament to the thought and organisation which had obviously gone into the planning of the event that each one of these attendees went away having not only thoroughly enjoyed it, but also having taken in plenty of useful information about, and with an improved understanding of, their industry.

The event highlighted the positive aspects of the nuclear sector and showed that there is plenty of outstanding work going on across many disciplines and fields of expertise within the industry. It left the delegates with the knowledge that better communication, both internally and externally, can only lead to an improved perception of, and confidence in, the nuclear industry, thus ensuring a bright outlook for their respective futures in nuclear.

Chris Farrell, British Nuclear Group.

PM Visit to Sellafield

Tony Blair’s visit to Sellafield – The YGN perspective by Matthew Aukett

The Prime Minister made a suprise visit to the Sellafield Nuclear Complex on the

16th November and requested to meet with younger members of the industry, including apprentices, graduates and members of the BNES Young Generation Network. Following Mr. Blair's guided tour of the site, Linda McLean and Matthew Autket had the opportunity to welcome Mr. Blair off the tour bus and took him meet 8 fellow young members of the nulcear industry, including two YGN core committee members. Mr. Blair enquired about what work people were undertaking and their career history. He then proceeded to the British Technology Centre, where he gave a speech to a selection of the workforce. During his speech he commended the work being undertaken at Sellafield as a part of the clean-up mission and gave an extremely uplifting and positive speech about the future of the industry and the Sellafield site.

In summing up the importance of the Prime Minister's desire to meet the next generation of the nuclear industry, Linda McLean said: "The fact that the Prime Minister took time out from a very busy schedule specifically to meet some of the graduates, apprentices and young generation shows he understands nuclear is not an industry that is in decline, but is rather an industry that is providing lots of interesting and challenging opportunities, noting today's 'Younger Generation' is key to the success of the industry."

Christian Guiotto
YGN Comms Officer
www.ygn.bnes.com

Hello, and welcome to the YGN Education & Training e-Bulletin. This month we take a look at **Sheffield University** and its internationally renowned **Immobilisation Science Laboratory (ISL)**. Plus, in this bulletin, we also provide a 2007 events update.

The ISL is based at the Department of Engineering Materials at the University of Sheffield. It offers educational and training opportunities at undergraduate, masters and postgraduate level. Students studying for either a Batchelor or Master of Engineering Degree have radioactive waste immobilisation techniques taught them as part of their course. Students on the M.Eng, can supplement this with a long term project in their final year on a specific radwaste topic.

The Nuclear Environmental Science and Technology M.Sc. course is specifically designed to teach the fundamental underpinning science of waste immobilisation. Advanced courses on cements, glasses and ceramics are supported by lecturers from industry giving the students their experience of site specific problems.

PhD projects within the ISL are available

in five specific areas of immobilisation, cements, glasses,

ceramics, materials modelling or deep borehole disposal. Most students at the ISL have an academic and industrial supervisor and benefit greatly from this close association with industry. If you are interested in studying for a Ph.D. on any of these topics please contact the ISL Manager Dr John Roberts via the details below.

The Radioactive Waste Immobilisation Network (RWIN) is co-ordinated by the ISL and holds regular meetings on radwaste at various locations throughout the UK. The meetings showcase current technologies and are an excellent way for the radwaste community to stay up to date as well as providing education and training to people new to the field. Further details are available from the RWIN website at: www.rwin.org.uk

MRS 2007 Symposium on the Scientific Basis for Radioactive Waste Management

The ISL is hosting the 31st Annual Meeting of the most important technical event on the international radwaste calendar. The meeting will be held in Sheffield from September 16 - 21 2007 bringing together scientists from all over the world to present their work. More information including the call for abstracts, which is now open, is available from the website mrs2007.sheffield.ac.uk

To find out more about Education and Training opportunities at the ISL please contact the ISL Manager at j.w.roberts@sheffield.ac.uk or visit the ISL website at www.immobilisation.net

The cutting edge academic work that the ISL and Sheffield University carry out may seem a bit academic to some people but it provides an alternative and benchmarking way of working for the industry. The eagerness to engage with industry and maintain links with the R&D sector should see its work grow in influence, especially in cementitious immobilisation.

YGN 2007 Event Update:

26 – 28 March	YGN Reactor Seminar	FULLY BOOKED (Reserve places only)
May 2007	**YGN Defence Seminar**	NEW THIS YEAR! BOOKING SOON
September 2007	ICEM '07	YGN SESSION AT INTERNATIONAL CONF
September 2007	France, Technical Tour	BOOKING SOON
10– 12 October	YGN Rough Guide to Sellafield	FULLY BOOKED (Reserve places only)
26 October (tbc)	YGN Annual Dinner	BOOKING SOON

http://www.euronuclear.org/e-news/e-news-16/ygn-russia.htm

MEMBER SOCIETIES

Winter School “PR Technologies: How to Work with Public and Media”

The Winter School “PR Technologies: How to Work with Public and Media” was held in Rosatom’s State Regional Education Center, in St. Petersburg, on February 5 and 6 2007. The event was organized by WIN(Women in Nuclear) Global and the St. Petersburg Nuclear Society, with the support of TVEL Corporation – a Russian nuclear fuel producer. Trainers, as well as PR experts from Switzerland, Slovenia, Hungary and Bulgaria, extensively shared their experience with young specialists from various cities in Russia.

The first day featured a master class on strategic PR which from Irene Aegerter, the Honorary Chair of the Winter School and a member of the Swiss Federal Nuclear Safety Commission (SKA) and Vice President of the Swiss Academy of Engineering Science (SATW). She instructed the attendees to broadly use emotive tools along with technically "rationaled" arguments.

She stated it was impossible to answer the question “Is nuclear good or not for mankind?” using only technical arguments. The nuclear age entered human consciousness with the Hiroshima and Nagasaki bombs. It raised fears about nuclear energy that reached phobia proportions. She urged that emotions be used in order to address this psychological problem. Irene revealed her working methods and called upon experts to more actively use independent organizations and experts who were pro-nuclear and trusted by the public.

Another master class was given on Integrated Communications Approach where the Head of the Planning and Development Agency for Radioactive Waste Management, Nadja Zeleznik (Slovenia), outlined a new communications approach which had been used in the siting of a waste storage facility in Slovenia. She stressed that

communications and information activities should be started as soon as possible with projects that are not always favored by the public. This would avoid potential conflicts of interests between the public and the company responsible for the construction, she noted. Nadja also described all the various tools used in the process, from the website to information placards. She concluded by saying that the use of this integrated communications approach helped to avoid conflicts and ensure that the public was adequately informed at all times.

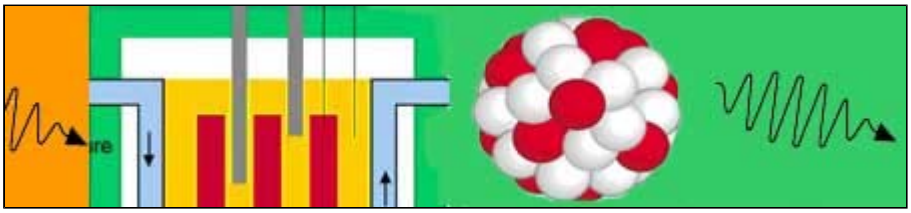
The Hungarian Nuclear Society's President, Tamas Pazmandi, outlined an outstanding PR initiative called the "Nuclear Tent," which had taken place during the international music rally, on Pepsi Island, in Budapest. He described all elements of the project (educational seminars, public debates with Greens, distribution of small gifts, polls etc.) and mentioned the HNC's Youth Section's interaction with the public. In particular, one point of interest was the interaction with physics teachers (Scholl teachers) at the Annual Physics Teachers' Conference. The Youth Section's activities had a positive effect upon young Hungarians' attitudes towards nuclear power, he said.

The Winter School's second day was also very informative with regards to crisis PR techniques in use at the Kozloduy nuclear power plant, in Bulgaria, and the plant's relations with the media. In the end, all Winter School attendees – who included representatives of MIFI, Mashinostroitelny Zavod, the Leningrad nuclear power plant and several nuclear industry enterprises – were given an attendance certificate. Attendees devoted their free time to strolling about St. Petersburg and socializing.
For more information about this event, refer to Tamas Pazmandi's website: portl.kfki.hu/StPetersburg.

Yekaterina Ryabikovskaya, Winter School Organizer

http://www.euronuclear.org/e-news/e-news-16/euratom-treaty.htm

EUROPEAN INSTITUTIONS



50 years of the Euratom Treaty: reflecting on the past, safeguarding the future.

This month will see celebrations to mark the fiftieth anniversary of the signing of the Treaty of Rome that established the European Economic Community (EEC) – the forerunner of today's European Union. Amid the banner-waving, rousing speeches and media attention devoted to assessing the successes and failures of the "great European experiment" it might escape the public's attention that the occasion also marks the fiftieth anniversary of the Euratom Treaty. This anniversary will doubtless be celebrated with less razzamatazz than that of the EEC Treaty but it is likely to provoke heated debate and polarised viewpoints. The Euratom Treaty has constantly been subjected to reappraisal and political scrutiny. It is correct that such an important treaty be the subject of scrutiny. At times, however, sensible debate has been hindered by unnecessary controversy borne out of a lack of understanding of the origins, objectives and functioning of the Treaty. It continues to suffer the vitriol of lobbyists and governments opposed to nuclear energy, who have a tendency to ignore the facts. As the saying goes, "never let the truth get in the way of a good story."

Whatever your views on the Euratom Treaty might be, its fiftieth anniversary will undeniably put the spotlight once again on its relevance, applicability and future. So, it is worth reminding ourselves of exactly what the Treaty's main objectives were then – and remain today. In simple terms, the Treaty seeks to:

- contribute to the formation and development of Europe's nuclear industry, so that all Member States can benefit from nuclear energy
- enhance security of energy supply
- guarantee high standards of safety for the public and workers
- ensure that nuclear materials are not diverted from civil to military use

The Treaty has, of course, been adapted to take account of other treaty changes and has given rise to a substantial body of secondary legislation over the years. But 50 years on it is still in force. It is no less relevant today than it was then.

The most useful thing about anniversaries is that they invite us to look back, take stock, and apply the lessons of the past to the future. A brief look at the history of the Euratom Treaty is necessary to put things into proper context. Then the debate about the pros and cons of the Treaty, where it is today and what the future holds can begin in earnest.

Learning the lessons of history

When Egypt's leader Gamal Abdel Nasser nationalised the Suez Canal Company in 1956 to raise the revenue he needed to construct the Aswan Dam, he effectively blocked Europe's access to the rich oil fields of the Middle East. At that time two-thirds of Europe's oil was imported via the canal - and British banks and businesses had a 44% stake in it. The threat of military intervention by the British and of retaliatory action against Egypt by Israel led the Soviet Union to side with Egypt, to which it had been exporting weapons for some time. Faced with a potential armed conflict at a time when the scars of the Second World War were still fresh in Europe's mind, Britain, France and the US stepped away from the brink, in what was perceived as an embarrassing climb-down. Nasser's action had changed Middle East geo-politics for ever and spawned the first great energy crisis.

Europe was forced to seek alternative energy sources to ensure the security of energy supply that was essential to fire the furnaces of industry and to satisfy the increasing domestic energy demand that went hand-in-hand with the post-war economic recovery. Sounds familiar? The sense of ***déjà vu*** is overwhelming as Europe today once again seeks alternative energy solutions to guarantee security of energy supply, bring an end to over-dependence upon energy imports and meet rising demand. Once again nuclear energy provides a solution. The only difference today is that the climate change conundrum has added an additional irresistible argument in favour of nuclear energy that did not exist in the not so environmentally-conscious 1950's.

However, it should not be forgotten that nuclear science was already a well-established discipline and research and development programmes were being implemented long before the Euratom Treaty was signed. As early as 1945, France's President, Charles De Gaulle, had created the ***Commissariat à l'Energie Atomique*** (CEA) and the UK had established its first nuclear research centre, at Harwell. By 1947, the first British nuclear reactor had started operation and construction of two graphite-moderated and air-cooled reactors at Windscale began. In 1953 the CEA began building gas-cooled reactors at Marcoule. In 1955, EDF started building a 70MW graphite-gas reactor at Chinon. In 1956, nuclear electricity generation started for the first time in Western Europe, at Calder Hall. Nuclear technology and know-how existed and was on a development fast track. What was needed was a catalyst to provide the impetus for a lasting breakthrough; one that would translate the promise of nuclear science and technology into a practical source of base-load energy to sustain post-war economic and social development. Little did he know it at the time, but Nasser's act of naked protectionism had helped to accelerate that breakthrough and to set the wheels in motion for the creation and signing of the Euratom Treaty and for the coming of the nuclear age.

Two years after the EEC and Euratom Treaties came into force nuclear organisations in the six countries that first signed the EEC and Euratom treaties - Belgium, France, Germany, Italy, Luxembourg and the Netherlands – joined forces to create FORATOM. Its mission then, as today, was to promote the interests of the European nuclear industry and civil applications of nuclear energy. The nuclear industry needed a unified voice to back up concerted action. FORATOM provided the

platform to make that voice heard. FORATOM has continued to adapt to changing circumstances and to grow. Today it counts member associations in 17 countries and represents the interests of over 800 companies. Like the Euratom Treaty, it has stood the test of time. From the initial "golden age of nuclear," via the tragedy of Chernobyl, to today's nuclear revival - Euratom and FORATOM have lived through it all.

Achievements

Fifty years after it was first signed the Euratom Treaty is still meeting the objectives that it fixed in 1957. Nothing has changed – ensuring that the legislation is strictly adhered to, promoting operational safety and efficiency, ensuring that fissile materials are not allowed to be misused for military purposes and promoting the internal energy market are just as relevant and important today as they ever were. Such fundamental objectives as these are never likely to become redundant. They should not be compromised. Furthermore, supporting research that will secure Europe's energy future long after polluting fossil fuel resources have been exhausted will always remain a Treaty priority.

But the Treaty has done more than simply meet its objectives. It has achieved a lot. Its most notable successes have been in the area of safety, with the fixing of comprehensive safeguards and the introducing of strict benchmarking standards. It is important to remember here that the Euratom Treaty never forced any EEC Member State to use nuclear energy. That choice was ultimately theirs and theirs alone. Instead it placed strict radioprotection safeguards on those that chose to opt for nuclear. The inadequate safety standards in operation at Chernobyl in 1986, which were outside of the Euratom Treaty's sphere of influence, were a major contributing factor to the terrible disaster. While it would be unrealistic to say that a disaster could never happen at a European nuclear plant, it cannot be denied that the safety record of the nuclear industry in the EU is second to none - and the Euratom Treaty has helped bring this about.

Euratom loans have also helped to implement safety upgrades and decommissioning programmes in the EU. It has helped maintain this safety benchmark for the industry and has ensured that these standards have been maintained. This has directly contributed to the industry's impressive safety record.

The safeguards on the handling and distribution of fissile materials provided by the Treaty have been proven to play a very effective role in ensuring that civil nuclear materials are not misappropriated for military uses. In today's world, where the threat of terrorism is ever-present, this is a significant achievement.

The Treaty ensures that a regular and fair supply of uranium and nuclear fuels is maintained and this is done through the careful monitoring and approval of supply contracts by the Euratom Supply Agency. This helps ensure security of supply – and we all know how this issue, together with reversing excessive dependence upon energy imports, is driving EU energy policy at the moment.

The Treaty has also achieved notable successes in the area of research. For example, it continues to foster nuclear R & D via the EU's 7th Framework Programme and the work of the European Commission's Joint Research Centre. Joint undertakings like the Joint European Torus (JET) and ITER, which focus on fusion technology, ensure that research concentrates on continuously modernising nuclear technology and on identifying longer-term nuclear solutions. By encouraging research information

exchange and transfer of knowledge the Treaty has encouraged the wider goal of European integration by developing a thriving European scientific community. This also encouraged the creation of the European Nuclear Society (ENS).

On the international front, the Treaty has enabled major nuclear co-operation agreements to be signed, e.g. with the US, Japan, Australia and Canada. These agreements have helped to provide a basis for increased shared security and safety on a global scale.

Finally, the Treaty has helped to establish a European market for nuclear energy in which access to materials and security of supply play a key role. This is consistent with the principles of the European Single Market.

For a variety of reasons opponents of the Treaty have long campaigned to have it scrapped. The nuclear industry, with the support of FORATOM, continues to answer these criticisms by putting forward counter-arguments that emphasise the objectives, workings and achievements of the Treaty. While recognising that the Treaty is not perfect (which piece of major legislation ever is?), the nuclear industry defends the key role that it plays in helping to ensure that a safe, well-regulated and efficient industry can continue to deliver the secure supply of electricity that contributes to meeting rising energy demand. The Euratom Treaty provides the nuclear industry with the legal framework to deliver. At the same time the Treaty makes it extremely difficult for nuclear technology to be misused for military purposes.

What about the future?

What does the future hold for the Euratom Treaty? As we have seen, the arguments in favour of retaining it are just as strong today as they have ever been and the fact that we are experiencing a global nuclear revival makes the Treaty all the more relevant and necessary.

FORATOM continues to monitor the debate surrounding the Treaty and the work of the Euratom Sub-group of its Legal Affairs Working Group focuses on answering calls for the Treaty to be scrapped. Let's not forget that those calling for its demise are quite simply anti-nuclear whatever the context and irrespective of what the Treaty stands for or has achieved.

The main thrust of industry's response is to emphasise how it is not just in the industry's interest that the Treaty should remain applicable, but also in the interest of EU citizens. After all, they ultimately benefit from secure supplies of safe, environmentally-friendly energy at a competitive price. These are not only the key objectives of the EU's energy policy, but also support the three pillars (social, economic and environmental) that lie at the heart of its sustainable development strategy. The nuclear industry is not insensitive to some of the Treaty's shortcomings and acknowledges that some parts of the Treaty work less well than others. Surely no piece of legislation can survive for fifty years without exhibiting some weaknesses. But the risks involved in changing or scrapping it far outweigh any potential gain. The industry's position on the Euratom Treaty remains clear, however; in spite of its shortcomings, it must - and will - continue to provide the legal framework and set the standards.

The current nuclear revival continues to gain momentum, precisely because of its increasingly recognised security of supply and CO_2 reduction credentials. Several EU countries with nuclear phase-out policies in place have already reviewed or are

currently reviewing their approach to nuclear energy. Other countries are extending their nuclear capacity or opting to go nuclear for the first time. Today, there is a much more pragmatic acceptance that nuclear, as part of an overall energy mix that includes renewables, offers the best solution to Europe's energy and environmental needs. Governments, citizens and environmentalists alike are reassessing their viewpoint and embracing this reality. The future of the Euratom Treaty is inextricably linked to the future of the nuclear industry and that future looks to be quite promising at the moment. So, as the saying goes, "if it aint broke, don't fix it."

Happy 50th birthday Euratom Treaty!

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http://www.euronuclear.org/e-news/e-news-16/50-years.htm

EUROPEAN INSTITUTIONS

50 years old and going strong: FORATOM toasts health of Euratom Treaty.

The 25 March 2007 marked the fiftieth anniversary of the Euratom Treaty, which together with the Treaty of Rome and the European Coal and Steel Treaty, created the legal basis for today's European Union.

To put the achievements of the Euratom Treaty into perspective it is worth recalling the fundamental objectives that defined it. These were to encourage development of a European

nuclear industry; to enhance security of supply, to guarantee high standards of safety for the public and workers and to ensure that nuclear materials were not misappropriated for military uses. In addition, the Treaty encouraged investment in R & D, maintaining Europe's leading role in this scientific field and supporting the development of a thriving scientific community.

The Treaty thus provided a stable legal framework that encouraged the growth and development of the nuclear industry while regulating safety and security. Thanks to the Treaty, Europe's citizens continue to enjoy the benefits of nuclear energy, namely a secure, affordable and environmentally-friendly source of base-load electricity.

The recently published European Commission (EC) Communication ***50 years of the Euratom Treaty*** summed up in positive terms the actions that have been carried out under the auspices of the Treaty as follows: "It is recognised as having made significant achievements in the field of research, the protection of health, safeguarding the peaceful use of nuclear materials and international relations."

The Second Vice President of the European Parliament, Professor Alejo Vidral-Qadras (EPP- ED, Spain), underlined the lasting relevance of the Euratom Treaty: "Today, the EU is facing a problem of security of supply through over-dependence upon fossil energy imports, as well as the threat of accelerating climate change. Nuclear energy, with its readily available fuel supplies and very low greenhouse gas emissions, provides an important part of the solution to both these problems. The Euratom Treaty is, therefore, just as relevant and essential today as it was back in 1957."

The EC Communication on the Euratom Treaty is available online at:
ec.europa.eu/prelex/detail_dossier_real.cfm?CL=en&DosId=195505

The relevant EC press release can be consulted (currently in French only) at:

www.europa.eu/rapid/pressReleasesAction.do?
reference=MEMO/07/118&format=HTML&aged=0&language=FR&guiLanguage=e

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http://www.euronuclear.org/e-news/e-news-16/opal.htm

ENS WORLD NEWS

Australian Government
ansto
Nuclear-based science benefiting all Australians
Australian Nuclear Science and Technology Organisation

27 February 2007

Second Neutron Beam Instrument Online as OPAL Returns to Full Power

Following the OPAL reactor's successful return to full power, ANSTO's* second state-of-the-art neutron beam instrument – Wombat – went on-line for the first time. In honour of the reactor, scientists selected an opal gem as a test material for neutrons to penetrate and determine its atomic structure.

Costing $5 million to build and being totally unique, the High Intensity Powder Diffractometer has the power to detect a million neutrons a second and to produce data on the structure of materials in milliseconds.

"The instrument's called Wombat because it's the only one in the world with this kind of grunt," said Dr Shane Kennedy, Head of ANSTO's Neutron Beam Instrument Project.

"Australia is exceptionally lucky to have Wombat, as it means we can now drive research to help us develop new materials as well as better understand materials production processes, how the earth is structured and what materials do in extreme

environments.

“Wombat will let us run in-situ experiments in real time,” explained Dr. Kennedy. “For example, if you want to know at the atomic level how a metal will respond if rapidly heated to 900 degrees C, put in an electric field or chilled to hundreds of degrees below zero, Wombat will show you.

“This type of information is crucial for refining manufacturing processes or knowing how to better extract minerals from rock, because we can see what is happening atomically during the production process.

“The refining of some manufacturing processes tends to be a little hit or miss, as what happens to materials at the atomic level during manufacturing has not been accurately measured before. In Australia, this is about to change, thanks to this technology,” said Dr. Kennedy.

One of those carrying out the test was Dr. Andrew Studer, the instrument scientist responsible for bringing the instrument on line. Dr. Studer said they tested the opal gemstone today because it seemed fitting as a first test using the OPAL reactor’s neutrons, but explained that over the next couple of weeks other materials would be tested on Wombat.

“For example, we intend to test a material thought to be prolific in the earth’s mantle, which surrounds the core,” said Dr. Studer. “It’s a tiny sample, created at the same temperatures and pressures that exist hundreds of kilometres beneath our feet.”

Wombat will also play a major role in the search for a material that can successfully hold significant quantities of hydrogen, which in turn could be used to provide clean power.

“For example, batteries in laptops use hydrogen-absorbing metal, known as a hydride, for power,” said Dr. Studer. “These batteries are pretty heavy and don’t last long between recharges, so scientists want to develop a lighter material that can also hold more energy and last a long time,” said Dr. Studer. “We can play a major role in developing such a material. It’s very exciting.”

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* ANSTO is the Australian Nuclear Science and Technology Organisation, the country’s national nuclear research and development organisation and the centre of Australian nuclear expertise – over 70 per cent of all radioisotopes used in Australian nuclear medicine are made in ANSTO’s reactor.

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Scientists Tell UN Climate Change Report To 'Boost Nuclear In Energy Mix'

1 Mar (NucNet): A new report by an international panel of scientific experts endorses the further development of nuclear energy and renewables as part of a global energy mix to fight climate change.

The report for the United Nations Department of Economic and Social Affairs*, released on 27 February 2007 and a copy of which was presented to UN Secretary-General Ban Ki-moon, says switching from fossil fuels to renewable and nuclear energy sources is necessary to keep the level of atmospheric CO2 down.

However, the report warns that "a major expansion (of nuclear power) will only be possible if the nuclear industry and its regulators can successfully address concerns about safety, vulnerability to terrorist attack, management of nuclear wastes, and links to nuclear weapon capabilities".

One of the report's authors, Diana Uerge-Vorsatz, a professor and Ph.D programme director at the Department of Environmental Sciences and Policy at the Central European University in Budapest, Hungary, told NucNet today: "Certainly nuclear is included in the report because of the part it should play. But the committee had to also point out that the industry first had to clearly explain how problems of spent fuel storage and waste would be dealt with."

Nuclear fission generation costs are typically 20 percent above those for conventional electricity generation from coal (where coal is cheap), but this differential would shrink or disappear if a substantial price were placed on carbon emissions, the report says.

Among non-fossil alternatives, the report says wind power is the most rapidly growing electricity source worldwide in percentage terms. But while expansion potential for wind power is large "the practical limit may be considerably smaller because of high costs at less windy or more remote sites".

The report urges policymakers to limit temperature increases from global warming to

between 2 and 2.5 degrees Celsius above the 1750 pre-industrial level to avoid a "sharply rising danger of intolerable impacts on humans", adding: "It is still possible to avoid unmanageable changes in the future, but the time for action is now."

**The panel of experts that prepared the report was convened by Sigma Xi, the Scientific Research Society. The report, 'Confronting climate change: avoiding the unmanageable and managing the unavoidable', can be downloaded from the United Nations Foundation web site (www.unfoundation.org).*

Contact the editor on this report john.shepherd@worldnuclear.org

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