European Nuclear Society
e-news Issue 13 July 2006

In this issue

"Summer time, an' the livin' is easy; fish are jumping and the cotton is high." When the American composer George Gershwin penned those famous words he evoked a timeless, idyllic vision of summer that we usually associate with our long-lost youth. Whether lazy hot days chilling by the pool is your thing, whether playing tennis, sampling local cuisine or enjoying a bit of culture is what you are hooked on, one thing is sure - we are all entitled to a bit of ***dolce vita*** now and again; we all need our annual fix of vitamin D and relaxation to recharge our batteries. So, when summer fails to show up and generate a healthy dose of the feel good factor, we can get understandably depressed.

Well, with the amount of rain that fell in some parts of northern Europe during May and early June, there are many who could be forgiven for thinking that summer, far from being just around the corner, is in fact a remote and alien concept dreamt up by *Neckermann or Club Med* to persuade us to part with our hard-earned cash. For some people who suffer from seasonal affective disorder (appropriately "SAD" for short) torrential rain in May and June is sometimes enough to make Prozac seem a reasonable option.

The truth of the matter is that climate change continues to set the global agenda. For many of us the threat of drought or the prospect of devastating forest fires has temporarily receded thanks to virtually constant rainfall and temperatures more reminiscent of winter than spring or summer. But it's just a matter of time until another climate change induced episode wreaks havoc and destruction somewhere in the world. From the fear of drought to flood warnings….the words "out" "fire" and "frying pan" spring to mind. How ironic that one manifestation of climate change should be brought to an end by another.

The evidence is irrefutable and yet there are still people who believe that climate change is just a cyclical phenomenon rather than a manifestation of man's footprint on the planet. Clearly, it's high time that those people who still doubt the influence of climate change woke up and smelt the coffee. There is a lot that can and ought to be done to combat climate change and reverse current trends. Nowhere is this more apparent than when it comes to satisfying the world's spiralling energy needs. More and more countries have recognised the new reality and come to the conclusion – some more reluctantly than others - that only nuclear energy can offer an effective long-term solution to the fossil fuel emissions that foster the global warming that triggers climate change.

Of course, for nuclear scientists this might seem like preaching to the converted. But perhaps we should do more to make scientific fact more accessible and understandable to those who still need to be persuaded? A wise man once said

"Science is the apotheosis of the intellect" and perhaps that's the problem. Unless we improve our ability to translate complex scientific concepts and data into a simple language that people can easily understand, much of what we communicate will fall on deaf ears. If, in the eyes of a non-scientific majority science remains the domain of an intellectual minority that speaks an unintelligible foreign tongue, than we will have failed to reach out to the widest possible audience. Rather than leave it up to natural disasters and extreme weather episodes to hammer home the message that climate change is real - and that nuclear energy can help combat it - perhaps we could do more to preach the message to the unconverted? It's just a thought.

As, for most of us, the countdown to the summer holidays has just begun, we can only hope that climate change will take some time off and allow us to enjoy a real summer where droughts, flash floods, forest fires and dangerous ozone levels are a distant memory. Perhaps we will be able to experience again a long hot summer like those that were common currency when we were younger. Now there's a thought.

Wherever you are and whatever you are doing this summer, enjoy it.

In Issue N° 13 of ***ENS NEWS***, ENS President, Frank Deconinck, gives a personal vote of thanks to the outgoing ENS Secretary General, Dr. Peter Haug, for all that he has done for ENS these past five years. He then welcomes his successor onboard, Santiago San Antonio. Also in the **ENS NEWS** section is an article by Andrew Teller that exposes the flaws in the commonly-expressed anti-nuclear argument that the advantages that nuclear energy brings amount to "too little" and "too late."

In the **ENS Events** section, we look back at the recent RRFM conference in Sofia, which focused on research reactor fuel management issues, and look forward to TopSeal 2006 (17-20 September, in Olkiluoto, Finland) TopFuel 2006 (22-26 October, in Salamanca, Spain), PIME 2007 (11-15 February, in Milan, Italy) and ENC 2007 16-19 September, in Brussels. Updated information on all ENS events is regularly posted on the ENS website.

The **Member Societies and Corporate Members** section of Issue N°13 first takes us to Petten, in the Netherlands, where the research reactor operated by NRG (the Dutch national research institute) recently converted to using low-enriched fuel. Readers can then read about how an analysis using neutron kinetics puts a new slant on the Chernobyl accident. Next on the agenda is an insight into the energy challenges facing small and medium-sized electricity grids - a contribution from our colleagues in Croatia. The section finishes with an introduction to the activities of the Slovakian Nuclear Society (SNUS) and a snippet of news from our friends in Israel.

Youth and dynamism abound in this summer edition of ENS NEWS, with a detailed **YGN Report** on the International Youth Nuclear Congress (IYNC) that took place in June in Stockholm and included a technical tour to Olkiluoto, in Finland.

In the **European Institutions** section there are three articles that focus on events and initiatives involving Members of the European Parliament: firstly, the results of the latest MEP Forum for the Future of Nuclear Energy, which was devoted to a debate on the economics of nuclear energy; secondly, a detailed report on an MEP visit to the salt mine, interim storage and radioactive waste disposal facilities at Gorleben, in Germany; finally, an analysis of the important vote of the European Parliament's ITRE Committee on the Euratom FP7 budget, which took place recently.

We hope that you enjoy reading **ENS NEWS** N°13. As always, your feedback on it is content and style would be very welcome.

In the meantime the **ENS NEWS** team wishes its readers a lovely, sunny summer!!

Mark O'Donovan
Editor-in-Chief

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http://www.euronuclear.org/e-news/e-news-13/presidents-contribution.htm

ENS NEWS

Word from the President

Auf Wiedersehen Peter,

At the turn of the millennium, ENS was in a critical financial and administrative situation. The Secretariat, then situated in Berne, was without a Secretary General and the finances were at zero. The situation required drastic measures for ENS to survive. Those measures involved sharing the secretariat with Foratom, in Brussels,

and with a common ENS Secretary General and Foratom director general. The person who was appointed to run both jobs and to save ENS from bankruptcy and certain death was Dr. Peter Haug. During the past five years, Peter has succeeded in overcoming all the obstacles and helped the Society survive periods of crisis. He was able to put ENS back on the European nuclear map.

Today, ENS once again has an excellent Secretariat, and its financial situation is acceptable and improving. Of course, he was not alone in achieving this. He was able to count upon the help of three former ENS presidents: Agneta Rising, Andrej Stritar and Bertrand Barré. He also surrounded himself with very dynamic and efficient staff members. But it was Peter who was, undoubtedly, the driving force behind the ENS renaissance.

Today, Peter leaves Brussels to enjoy his well-deserved retirement. On behalf of all 24.000 (or is it 25.000?) ENS members, thank you Peter, most sincerely, for all you have done for the Society and Auf Wiedersehen!

Bienvenido Santiago,

Santiago San Antonio has joined ENS, as the new Secretary General and Foratom, as the Director General. He succeeds Peter Haug at the head of both organisations. He has a great deal of experiencing working in senior positions with both organisations and has a great deal of experience in nuclear matters in general. Santiago has worked for Tecnatom since 34 years and during his career to date has been active with WANO, NEI, Nucnet, the Spanish Nuclear Industry Forum and the Spanish Nuclear Society. Those among you who do not yet know Santiago will discover a very experienced nuclear engineer, scientist. He is also a manager with great charisma who will leave his indelible mark on ENS in the years to come. We all look forward to working with him. Bienvenido Santiago!

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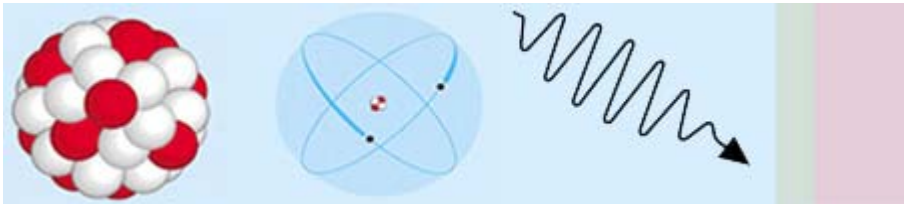
http://www.euronuclear.org/e-news/e-news-13/nuclear-energy.htm

ENS NEWS



Nuclear Energy: too little too late?

by Andrew Teller

Even a cursory glance through the international press is sufficient to notice two highly correlated types of articles. The first type is about decision-makers thinking of reviving the nuclear option to combat climate change. The second type reports pronouncements of skeptics claiming that nuclear energy is not the answer to the climate change problem. Under various guises, the arguments of the opponents boil down to two basic statements:

- the share of nuclear energy in the global primary energy supply is too small to make any noticeable difference to the actual amount of carbon dioxide emissions;
- it would take so much time launching a large-scale nuclear programme that it would start to kick in too late to achieve any useful purpose.

Let us examine these claims in turn. The first one is usually supported by a figure: nuclear energy amounts to 6% only of the total primary energy supply. So the argument goes: if nuclear energy helps to the tune of 6% only, we do not change the magnitude of the global warming challenge in any noticeable way if we renounce to nuclear power plants. This piece of reasoning is very clear, very simple to understand

and all too easy to accept. A moment of reflection shows however that it takes two conditions for granted: a) the world's total energy production is the right yardstick for measuring the contribution of nuclear energy and b) there are carbon-free solutions available in sufficient supply to permit avoiding (or replacing) NPPs at no extra cost. Unsurprisingly, neither condition is fulfilled. The contribution of nuclear energy must be assessed with respect to the objective to be reached, which definitely not the same as achieving zero CO_2 emissions.

Two scientists from Princeton University have come up with what is generally regarded as a realistic objective. They show how world CO_2 emissions could be stabilized to the current level of 7GtC (yes, 7 ***billion*** tonnes of carbon!) over the next fifty years despite an expected steep increase in energy consumption . This objective translates into avoiding the generation of 175 GtC during the said time span. On the other hand, phasing nuclear energy out would add about 20 GtC to that burden. I conclude from this that nuclear energy's contribution to the fight against climate change is equal to 20/175, i.e. 11.4%, and not 6%. Of course, one might easily argue that 11.4% is still not a lot. The picture will however be further altered if we shift our attention to the financial aspect of the matter. Carbon-free substitutes to nuclear power plants that would be equally cost-effective are not available in large quantities. Some wind farms might nowadays be competitive with NPPs as long as their overall contribution remains marginal. Pushing the share of wind energy beyond, say, 20% will leave the existing base-load generating capacity (all fossil-fuelled and nuclear) unable to compensate the intermittency of wind. This will require energy storage devices and push the cost of wind electricity to levels noticeably higher than those experienced so far. Other production means, such as off-shore wind and solar electricity will be even more expensive. We can therefore expect the cost of each additional tonne of carbon avoided to become dearer and dearer, as depicted in figure 1. The total cost of avoiding a certain amount of carbon emissions is numerically equal to the area under the curve. So, the cost of avoiding 175 GtC will be represented by area OAB. If we must make up for the phase-out of nuclear energy, we'll have to avoid 195 GtC and add to OAB a cost represented by area ABCD. Therefore, the relative contribution of nuclear energy is equal to the ratio ABCD/OAB. It is difficult to put precise figures on the curve in figure 1. Just to give an order of magnitude of the outcome that can be expected, it can be noted that, using the curve below, a nuclear phase-out would increase the bill by about 34%. One can assert that 34% is still not a lot. Should anybody do so, I would then suggest looking at the absolute figures lurking behind the percentages. According to an assessment made at the Massachusetts Institute of Technology , the cost of avoiding emissions of carbon in the (A-C) part of the curve in figure 1 could exceed 400 USD/tC for the United States. With a curve such as the one depicted below, this would yield an average cost of 185 USD/tC. Let us not go to such extremes and assume conservatively – and somewhat arbitrarily – an average cost of only 40 €/tC. Avoiding 175 GtC would then entail a cost of the order of 7 000 billions €. I do not see how anybody could possibly state that 34% of this amount is not a lot.

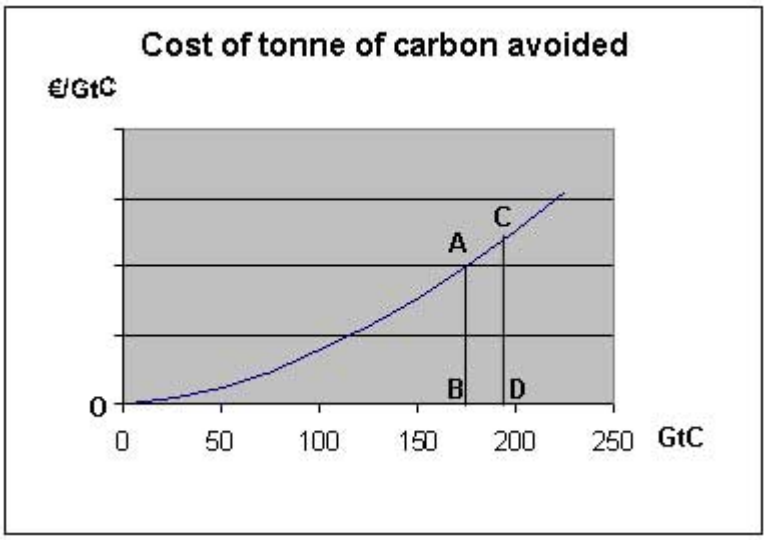


Figure 1

So much for the "too little" argument. What can we say about the "too late" one? Opponents of nuclear energy are quick to point out that the deployment of a sizeable fleet of new reactors would take decades and would consequently come after the death of the patient. I agree with the premise but not with the conclusion. Scaling up the current industrial capacity to meet increased demand will take time, but so will the implementation of additional gas transport capacity, or of wind farms capable of storing energy to be released when the wind does not blow. So will also achieving meaningful energy savings through better thermal efficiency in buildings or improved transport habits. Clearly, this argument sounds more like a lame excuse for dodging the nuclear option: lead time problems are not insuperable. Furthermore, while it is reasonable to start working on the problem now, it would be unreasonable to demand tangible results tomorrow. The article mentioned above under reference 1 confirms that 50 years is an appropriate time span for planning our actions and reaping the benefits thereof. This leaves nuclear energy ample time to provide an orderly and not-to-be-dismissed contribution to the fight against global warming.

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1 S. Pacala & R. Socolow ***Stabilization Wedges: Solving the Climate Problem for the Next 50 Years with Current Technologies***, Science, vol 305, 13 August 2004.

2 MIT Joint Program on the Science and Policy of Global Change, April 2000 (reprinted from Making Technology Work (p 105) by John M. Deutch & Richard K. Lester, Cambridge University Press, 2004)

http://www.euronuclear.org/e-news/e-news-13/rrfm2006.htm

ENS EVENTS

Specialists in reactor fuel management research gather in Sofia for RRFM 2006

The 10th annual Research Reactor Fuel Management conference (**RRFM 2006**) took place in Sofia, from 30 April to 3 May. It was organised by ENS, in collaboration with the Bulgarian Nuclear Society and Bulgaria's Institute for Nuclear Research and Nuclear Energy (INRNE). Approximately 200 delegates from Europe, as well as countries like the US, Argentina, Vietnam and China, met in the Bulgarian capital to discuss the latest developments in this highly technical field and to address some of the most pressing issues relating reactor fuel management.

Among the key topics on the conference agenda were fuel development, qualification, fabrication and licensing; spent fuel-management back-end options, transportation of spent fuel and reactor fuel safety. The keynote speakers included scientists, consultants and senior management staff from organisations like the IAEA, the US Department of Energy (DOE), the CEA (France) COGEMA Logistics, the Russian Academy of Science and the Dutch research centre, NRG.

RRFM 2006 kicked off with a session devoted to discussions of a broad range of issues of general interest to the research reactor community. Since the conference took place in Sofia, the first presentation was a situation update in Bulgaria. It featured a progress report on the reconstruction of the IRT 2000 research reactor (a water-water pool-type reactor), in Sofia. The IRT 2000 is a reactor used to produce electricity for civil consumption. However, since it can never be totally excluded that new or spent fuels is somehow illicitly misappropriated for military usage several initiatives aimed at preventing such a scenario from happening were launched. Among them are: the GTRI (Global Threat Reduction Initiative), which oversees the RERTR (Reduced Enrichment for Research and Test Reactors) Programme, the foreign Research Reactor Spent Fuel Acceptance Programme, the Russian Research Reactor Fuel Return Programme, the Global Research Reactor Security Programme and the GAP (a programme filling an existing gap) Materials Programme.

Under the GAP programme, GTRI works to develop partnerships with government agencies and operators to identify, remove and facilitate the final disposal of GAP materials. The first product of this collaborative effort was the project carried out by

GTRI and AREVA to decide upon potential reprocessing at AREVA's specialised facilities in France.

During this first session, delegates were also given an overview of global activities involving TRIGA reactors. One special application that was outlined was the reconstruction of the ENEA Triga RC-1 research reactor as part of the TRADE project (an ADS feasibility system).

The second session covered what is traditionally the hottest topic on the RRFM agenda, namely fuel development, qualification and licensing. This subject is of fundamental importance to any enrichment reduction initiative. The goal of research in this area is the final qualification of a high-density UMo fuel by the end of 2010 and the conversion of all reactors, including the US domestic high-power reactors, by 2014.

This year, RRFM also heard about the very encouraging results that have emerged from tests involving the addition of silicon in the aluminum matrix of dispersed fuels. Another issue analysed by delegates was the behaviour of UMo monolithic fuels under irradiation.

The third session was dedicated to spent fuel management, back-end options and transportation. Special emphasis was placed on the conditions required to ensure the safe long-term storage of aluminum clad fuels under water. Finally, delegates heard about the conditions and procedures that must be respected to ensure the successful reprocessing of MTR fuels at the La Hague plant, in France.

Session 4 focused on reactor operation, fuel safety and core conversion projects that have been carried out with the ITR-Sofia, FRM-II, HFR-Petten and HOR-Delft reactors. Other projects in this area that were presented included a new concept for a super high-flux reactor, the qualification of a Chilean test fuel element and the safety evaluation of the IRIS experiment.

In parallel to Session 4, RRFM included for the first time an extra session, entitled ***Innovative Methods in Research Reactors.***

Once again, RRFM, one of ENS' flagship annual technical conferences, proved to be a very successful platform for the exchanges of views and data between professionals in the nuclear energy sector. It is also a useful catalyst for discussion about the major factors influencing the future direction of reactor fuel management research.

For more information about RRFM - the full agenda, speakers, copies of the presentations etc., please visit the RRFM pages of the ENS website at: www.rrfm2006.org

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http://www.euronuclear.org/e-news/e-news-13/TopSeal2006.htm

ENS EVENTS

TopSeal 2006

17 - 20 September 2006, Olkiluoto, Finland

About TopSeal

Waste management is among the top priorities of the nuclear industry. The issue of safe, environmentally friendly waste disposal is crucial to improve public understanding. Therefore in the context of a renewed public and political debate on the role of nuclear in the energy mix to help meet Kyoto requirements, waste management has become vital to the future of nuclear.

The European Nuclear Society (ENS) is re-activating **TopSeal**, its international topical meeting on waste management, starting in September 2006. **TopSeal** will be organised every three years as a specialised technical meeting place for professionals in the field of waste management. Previous **TopSeal** editions took place in 1996 (Stockholm) and in 1999 (Antwerp).

TopSeal 2006 provides an excellent opportunity for all professionals working in the field of nuclear waste management to meet face to face, exchange expertise, and discuss state-of-the-art issues. The meeting is especially important for:

- Nuclear engineering designers
- Plant operators
- Safety assessment experts
- Rock construction experts
- Experts in geo-sciences
- Regulators

The technical programme will consist of both invited papers and accepted paper submissions, and will include debates on the state-of-the-art technology and R&D of waste treatment and disposal, national and international regulatory aspects, stakeholder involvement, and public communication.

The preliminary conference schedule is as follows:

- Sunday 17 September 2006
  Guided tour of Old Rauma (15.00-17.00) and Welcome Reception (19.00)

- Monday 18 September 2006
  Technical programme 09.00-17.00 followed by a Company Dinner offered by TVO and POSIVA

- Tuesday 19 September 2006
  Technical programme 09.00-17.00 followed by the Conference Dinner at 20.00

- Wednesday 20 September 2006
  Technical programme 09.00-12.00 followed by lunch and Technical Tour (13.00-15.00)

TopSeal 2006 is organised in cooperation with the OECD Nuclear Energy Agency and supported by the Finnish Nuclear Society (ATS). The conference is graciously hosted at Olkiluoto by Teollisuuden Voima Oy and Posiva Oy.

Further information

If you are interested in **TopSeal 2006** and wish to be kept informed, please ask the Conference Secretariat (topseal2006@euronuclear.org) to be included in the digital mailing list. You can also watch this website for updates.

Register now!

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http://www.euronuclear.org/e-news/e-news-13/TopFuel2006.htm

ENS EVENTS

TopFuel 2006

The Preliminary Programme is now on-line!
Registration FROM TODAY!

www.topfuel2006.org

TopFuel 2006 will focus on the importance of nuclear fuel developments in the light of the current revival of the debate on nuclear energy.

This topical conference provides a unique opportunity for all professionals in the nuclear fuel industry to meet face to face, exchange expertise, and discuss state-of-the-art issues.

The preliminary programme covers the following issues :

- Security of Supply
- High Burnup
- Fuel Manufacturing
- Methods and Models
- Fuel Performance
- Fuel Cycle Strategies and Core Management
- Spent Fuel Management
- LOCA & RIA Issues
- Advance in Fuel Design

download PRELIMINARY PROGRAMME

TopFuel 2006 will take place from 22 to 26 October in Salamanca, Spain

Register now!

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http://www.euronuclear.org/e-news/e-news-13/enc2007.htm

ENS EVENTS

ENC 2007

Mark your diary!

Sharing knowledge and providing insight on the latest developments in nuclear research and its applications – that is the aim of the **European Nuclear Conference** (ENC).

ENC2007 will take place in Brussels from 16 – 19 September 2007. The conference will have a multidisciplinary approach, looking at nuclear applications in energy production and medical technologies, and giving special attention to how they impact on our society and vice versa.

Call for Papers

Share your knowledge with your colleagues by presenting a paper related to the following subjects:

- new reactor and energy technologies
- the nuclear fuel cycle (including waste, transport, dismantling and partitioning & transmutation);
- nuclear operations;
- medical operations;
- human resources and education and training; and
- socio-economic, political and ethical considerations.

In the spirit of the multidisciplinary approach of **ENC2007**, contributors are encouraged to send in work that appeals to crossover thinking and context exploring.

Please submit your abstract by 31 of January 2007. The Call for Papers and abstract form can be downloaded from www.enc2007.org

Help us spread the news about **ENC2007** and make sure your colleagues get to know about the event through our website or via this e-mail.

We hope to see you in Brussels next year!

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http://www.euronuclear.org/e-news/e-news-13/pime2007.htm

ENS EVENTS

Pime 2007

Make time for PIME!

Dear Colleagues,

Bringing together nuclear communications specialists from around the world to share experiences, exchange views and promote communications excellence – that is the aim of PIME, the annual **P**ublic **I**nformation **M**aterials **E**xchange.

Now in its twentieth year, PIME has established itself as a not-to-be-missed key event for nuclear communications professionals. The secret of PIME's success is the combination of a thought-provoking programme and an array of experts and speakers representing the industry, EU institutions and the scientific community.

The next edition will take place from **11 to 15 February 2007** in **Milan**.

Dare to share!

Play your part in the success of **PIME 2007** by submitting your proposal for a presentation to the Programme Committee by 1st October 2007. Share your expertise with fellow communicators and help fashion the nuclear industry's future communications strategy. The attached Call for Papers includes all the necessary details.

Help us spread the news about PIME and make sure your colleagues in the communications field get to know about the event through our website or via this e-mail.

We hope you will join us in Milan next year!

PIME 2007 Conference Secretariat
www.pime2007.org
pime2007@euronuclear.org

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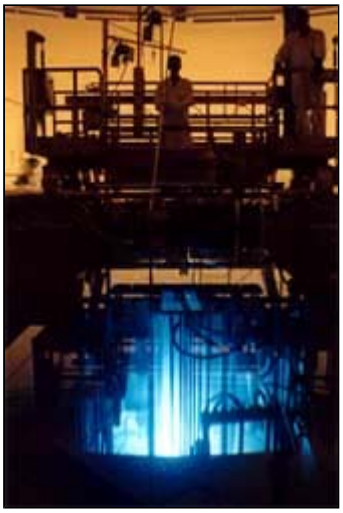
http://www.euronuclear.org/e-news/e-news-13/petten.htm

MEMBER SOCIETIES

Petten research reactor converts to using low-enriched fuel



On the 6th of May, NRG (the Netherlands' national nuclear research centre in Petten) started up its High Flux Reactor (HFR) for the very first time, with a core that consisted solely of low-enriched nuclear fuel. The conversion from high-enriched to low-enriched uranium was the result of a technical development programme that lasted several years and required the finalising of new licensing procedures and switching over to using a different type of nuclear fuel. Thanks to the efforts of the many employees involved, the conversion process went smoothly. One objective was to avoid any disruption to Petten's isotope production and other ongoing research programmes. With this conversion, Petten will offer an important contribution to the global effort of diminishing the use of proliferation-sensitive high-enriched

uranium (HEU).

In order to make U-235 suitable for use in nuclear power plants, the 235U content needs to be enriched. For nuclear power plants, the enrichment percentage of 235U is normally approximately 4%. Until recently, the HFR used HEU containing 235U of 89–93%. This high enrichment makes the HEU proliferation-sensitive, meaning that the fuel, which the HFR used to use until recently for civil purposes is also suitable for nuclear weapons. In order to prevent even the remotest possibility of certain countries or groups from obtaining this HEU to make nuclear weapons, NRG decided to switch to using low-enriched uranium (LEU), in which the amount of fissionable 235U is less than 20%. The Joint Research Centre (JRC), a European Commission Directorate General and formerly the HFR's licensee, made a concerted effort, together with NRG (the HFR's operator/user), to convert from HEU to LEU. This has now been achieved.

The JRC/NRG conversion project was planned in three phases: a feasibility study, the technical qualification of the conversion process and the licensing procedures.
The initial phase resulted in the formulation of detailed calculation models so that the reactor core could be optimised. The substantial percentage increase of the 'non-active' 238U decreases the thermal flux of neutrons and the core optimization made it possible to keep the reduction of the thermal neutron flux to a minimum. By adapting the calculation model in this way, the fission material can be optimized - by changing its density – in order to compensate for the lower degree of enrichment.

During phase two, the conversion was granted technical qualification following a comprehensive professional study, the carrying out of safety analyses, the testing the new nuclear fuel elements and the carrying out of thermal and hydraulic calculations.

Phase three focused on the licensing procedure. JRC is the HFR's owner but was also the licensee. Quite apart from the decision to switch from HEU to LEU, the license was in any case due for renewal. Since it was more logical that NRG, as the reactor's operator and user, should also become its licensee, these outstanding issues were easily resolved by obtaining the new license in NRG's name. This license transfer had already been recommended by the IAEA. When the license application was made the conversion process was included in the application request, so that when the authorities granted the license, in February 2005, the targeted conversion became a reality, at least in writing.

Last October, the first LEU elements were placed in the reactor's core. Now, for the first time, the HFR starts up using only LEU elements. Consequently, NRG and JRC are actively contributing towards reducing the use of proliferation-sensitive materials.
For more information about this development and about the other activities of NRG and the JRC in Petten visit the following web site: www.nrg-nl.com

http://www.euronuclear.org/e-news/e-news-13/neutron-kinetics.htm

MEMBER SOCIETIES

Neutron Kinetics of the Chernobyl Accident

The Chernobyl type of reactor has a positive void coefficient, which means that when a part of the water is replaced by steam the power will increase. At the Chernobyl experiment the steam content in the coolant channels increased suddenly causing a catastrophic power excursion. The presented analyses give details about the importance of the magnitude of the void coefficient. Also the delayed neutrons behaviour is described.

The classical reactor kinetic equations with six groups of delayed neutrons are not solved analytically. Here they are solved numerically with MATLAB and applied to the Chernobyl accident, the results are presented graphically.

Now, 20 years after the accident it is important for today's and tomorrow's generations of nuclear engineers to learn not to design reactors with runaway characteristics which can cause an avalanche like power excursion

The Chernobyl type of reactor core is a huge graphite cylinder (7 m high, 12 m diameter) and within some 1600 channels with water and steam cooled fuel inside. The fission neutrons are slowed down (thermalised) mainly in the graphite and a portion of them is absorbed in the water. When a part of the water is replaced by steam (void) the absorption becomes less, causing a positive reactivity contribution. This is the positive void coefficient. After the accident the enrichment of the fuel was increased the neutron spectrum became harder resulting in a lower positive void coefficient

At the Chernobyl experiment due to the abrupt decrease of the speed of the main circulation pumps and the sudden drop of the reactor pressure at low reactor power and heavy Xenon poisoning the steam (void) content in the coolant channels increased suddenly from a few percent to about 50%. Thus the positive void coefficient - about 30 pcm/% - caused a large reactivity insertion.

The neutron flux and thereby the reactor power increased very fast. Due to the thermal inertia of the fuel and the small value of the fuel temperature coefficient the Doppler effect could not break the power excursion. Therefore, to characterize the process at the initial phase, to use only the reactor kinetics equations is sufficient.

The simplified neutron kinetics equations

$$\frac{dN}{dt} = \frac{\delta k - \beta}{l} N + \sum_{i=1}^{6} \lambda_i c_i \qquad \text{and} \qquad \frac{dc_i}{dt} = \frac{\beta_i}{l} N - \lambda_i c_i$$

Here
t time (sec)
N neutron flux (proportional to the reactor power)

δk change of the effective neutron multiplication factor (k_{eff})

ß sum of the delayed neutron fractions (here 0.006502)
$ß_i$ the i:th delayed neutron fraction

l neutron mean lifetime (here 0.001 sec)

λi i:th decay constant (sec^{-1})

ci concentration of the i:th fraction of the delayed neutrons' precursors,
At steady state, when time is zero t=0 all time derivatives are equal to zero,
all d/dt=0 and the initial value of the relative power equals unity N(0)=1, and also
no reactivity perturbation is present δk=0

N(0)=1 $\frac{dN}{dt}=0$ $\delta k=0$ $\sum_{i=1}^{6}\lambda_i c_i=\frac{\beta}{l}$ $\frac{dc_i}{dt}=0$ $c_i(0)=\frac{\beta_i}{l\,\lambda_i}$

Delayed neutron data for thermal fission in U^{235} is used

Group	1	2	3	4	5	6
Fraction ßi	0.000215	0.001424	0.001274	0.002568	0.000748	0.000273
Decay constant λi	0.0124	0.0305	0.111	0.301	1.14	3.01

The initial values of the delayed neutrons' precursors are;

i	1	2	3	4	5	6
ci(0)	17.3387	46.6885	11.4775	8.5316	0.6561	0.0907

Using the MATLAB notations

x(1)=N x(2)=c1 ..... x(7)=c_6 the code is

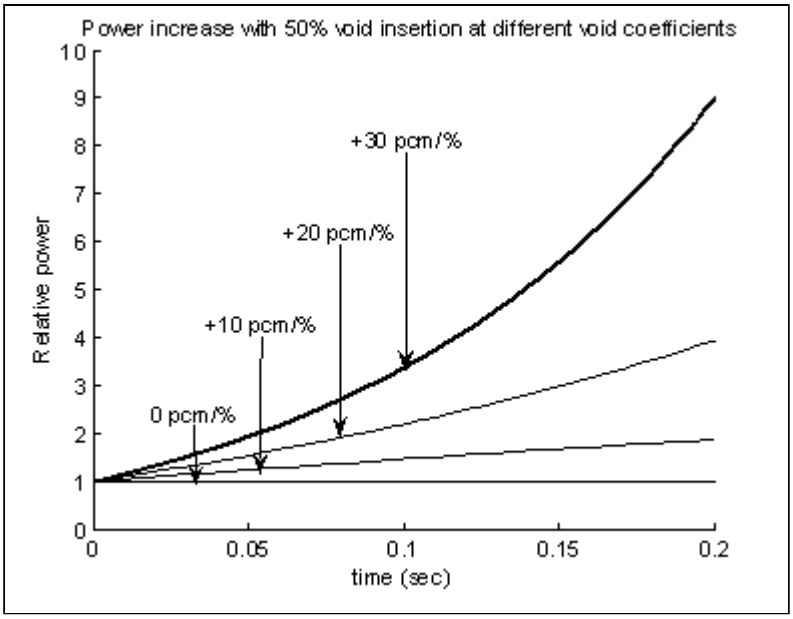
```
%Save as xprim7A.m
function xprim = xprim7A(t,x,i)
DeltaK=i*0.010*0.50; %voidcoef=i*0.010pcm/percent void change, void increase 50percent
xprim=[(DeltaK/0.001-6.502)*x(1)+0.0124*x(2)+0.0305*x(3)+0.111*x(4)+0.301*x(5)+1.14*x(6)
+3.01*x(7);
0.2150*x(1)-0.0124*x(2);
1.4240*x(1)-0.0305*x(3);
1.2740*x(1)-0.1110*x(4);
2.5680*x(1)-0.3010*x(5);
0.7480*x(1)-1.1400* x(6);
0.2730*x(1)-3.0100* x(7)];
```

To study the importance of the magnitude of the void coefficient, it is enough to plot the first colon of the x matrix. The rows of the x matrix are the time steps.

```
%Save as ReaktorKinA.m
figure
hold on
for i=0:1:3
[t,x]=ode45(@xprim7A,[0 0.2],[1; 17.3387; 46.6885; 11.4775; 8.5316; 0.6561; 0.0907],[] ,i);
plot(t,x(:,1))
end
hold off
```

The result

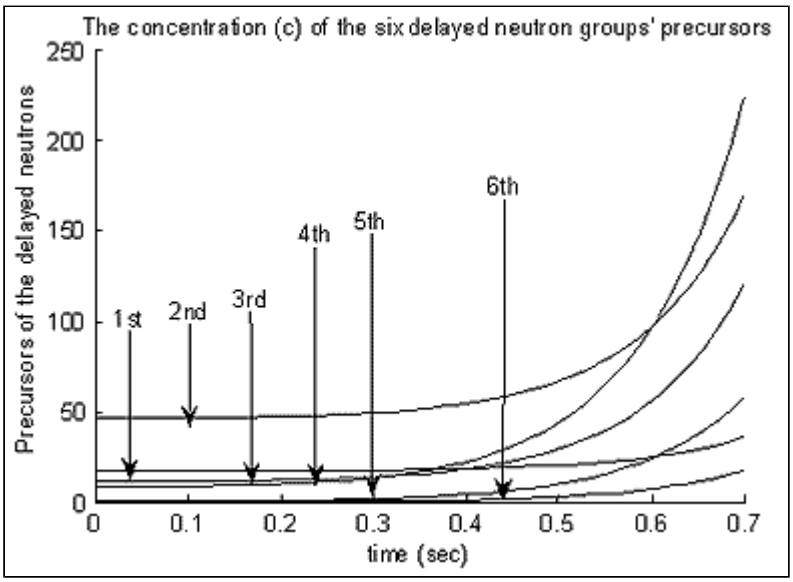
Is given in the following plot



It is obvious that, the more positive the void coefficient is, the faster the power is increasing. When the void coefficient is zero the power is not increasing at all. The Western type boiling water reactors have strong negative void coefficient meaning that a similar transient would quickly lead to the shut down of the reactor by itself

Delayed neutrons

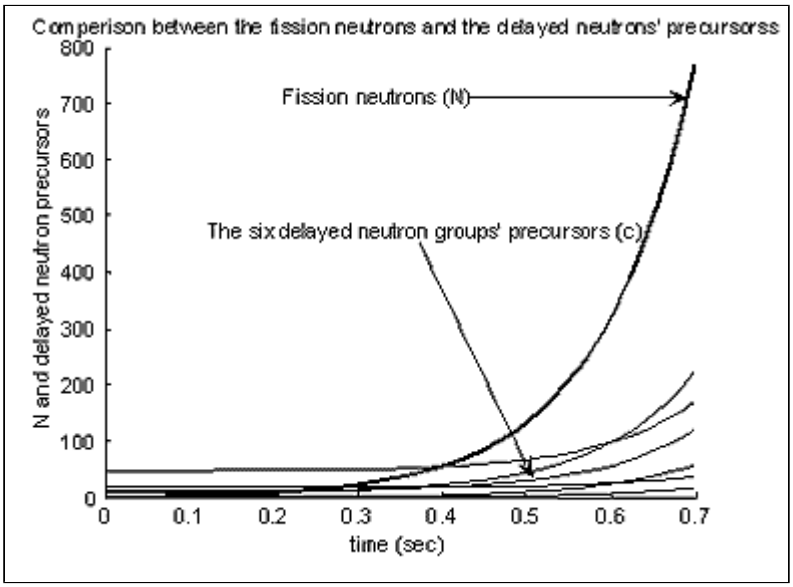
To study the course in time of the concentration of the delayed neutrons' precursors (c_1 to c_6) is also interesting. The following plot is for +30 pcm/% void coefficient showing the colons 2 to 7 of the x matrix



It is clear that the precursor concentration of the fastest growing group of the delayed neutrons is the 6th where the decay constant is the largest [λ_6=3.01] and the largest concentration of the delayed neutron's precursors at time zero is the 2nd group [$c_2(0)$

=46.6885]

To compare the evaluation of the behaviour in time of the fission neutrons and the six groups of delayed neutrons' precursors at +30 pcm/% void coefficient all seven colons of the x matrix are plotted here



Remarkably at the beginning of the transient [t=0] some of the delayed neutrons' precursors [$c_1(0)$, $c_2(0)$, $c_3(0)$, $c_4(0)$] are larger than the fission neutrons' flux [N(0) =1], while later, as the transient evolves the fission neutrons overwhelm grossly the delayed neutrons' precursors as expected.

Neutron Kinetics of the Chernobyl Accident

Frigyes Reisch
Nuclear Power Safety
KTH, Royal Institute of Technology
Stockholm, Sweden

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http://www.euronuclear.org/e-news/e-news-13/conference-in-croatia.htm

MEMBER SOCIETIES

Conference in Croatia focuses on countries with small and medium-sized electricity grids.

The Croatian Nuclear Society (HND), in cooperation with the International Atomic Energy Agency (IAEA), and with the sponsorship of the European Nuclear Society (ENS), recently organized the 6th International Conference Nuclear Option in Countries with Small and Medium Electricity Grids.

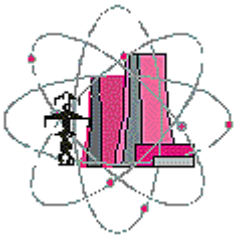
The conference, which took place from 21 - 25 May 2006, in the Croatian city of Dubrovnik, was a great success. 130 prominent scientists and experts from 27 countries participated. The results of this conference, as well as those observed from various similar scientific meetings around the world, confirmed that nuclear energy is an inevitable option if countries worldwide are to ensure the successful future development of power systems. This option is especially appropriate for countries with small and medium-sized electricity grids.

For more information about the conference agenda, speakers etc., consult the following website: (www.cro-nuclear.hr/dubrovnik2006).

http://www.euronuclear.org/e-news/e-news-13/slovak-nuclear-society.htm

MEMBER SOCIETIES

Introduction to the Slovak Nuclear Society



In spring 2006, **SNUS** celebrated the 16th anniversary of its establishment.

In accordance with the approved statutes, the main goals of **SNUS** activities are as follows:

- to coordinate and support creative activity, to satisfy the professional interests of its members and to provide them with the information they require ,
- to initiate and support a dialogue with the public aimed at addressing the ecological priorities of the development of nuclear energy as part of a set of sources of researched argumentation.

Membership:

SNUS had 30 collective and 602 individual members as of 1 January 2006. In addition to an extensive group of first-rate, enthusiastic seniors, **SNUS** also has a large number of young members (<35) – Young Generation in Nuclear.

Fig 1 shows the relevant information for January 1st. 2006.

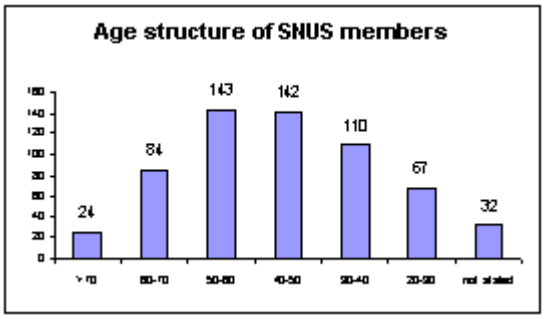


Fig.1

Fig. 2 shows the gender structure of our membership. We are very appreciative of the activity and expertise of our female members in the WIN section (Women In Nuclear).

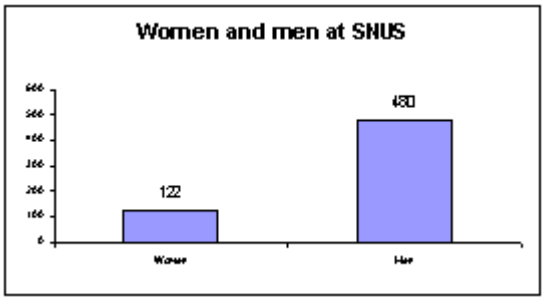


Fig.2

Educational structure:

SNUS members have a high average educational level (fig. 3) and its members include eminent experts in the fields of nuclear physics, nuclear technology, nuclear energy, nuclear chemistry, nuclear medicine and radio-environmental studies.

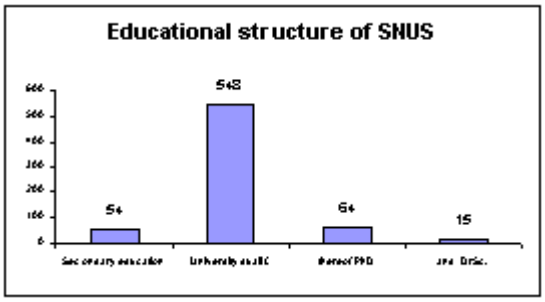


Fig.3

Many **SNUS** members undertake pedagogical activities and have been awarded academic titles, as Fig.4 illustrates.

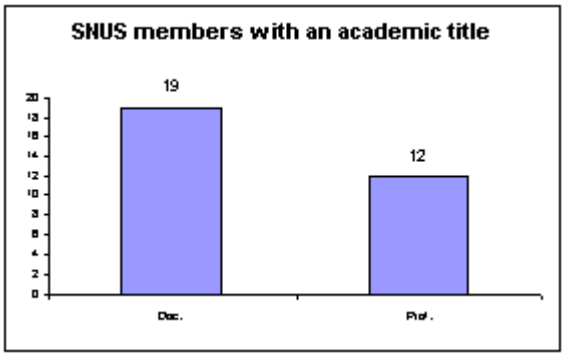


Fig.4

In 2002, **SNUS** established its Academic Council, whose Chairman is Prof. Pisut.

The members of the SNUS Committee (from 17.5.2006):

- Chairman of the Committee: Vladimir Slugen,
- Committee Members: Jozef Valovic (Secretary General), Jozef Markus (Vice-Chairman), Helena Novakova (Vice Chairwoman), Karol Rovny, Jozef Tomek, Jan Nano, Miroslav Jakabovic

The sections are headed by:

- WIN: Mariana Mancikova; YGN: Milos Lascek; Radio-environmental Studies: Jan Chrapan, from October 2005 Jozef Puskajler; Radiation Chemistry: Lubomir Matel; Radiation Hygiene: Alžbeta Füriova; Communication: Dobroslav Dobak, from September 2005 Rastislav Petrech.

SNUS issues a Bulletin (4 times a year as a rule) which is available on www.snus.sk and mailed to those members without access to an internet.

SNUS annually organises the NUSIM conference (**N**uclear **S**afety **I**nformation **M**eeting) together with the Czech and German nuclear societies (CNS and KTG). The NUSIM conference is held alternately by the organising countries. In 2006, it was held in Levice, Slovakia, from 27 - 28.4.2006.

SNUS has also organised regular half-day technical seminars for the public in the following areas (*topics in 2005*): Nuclear and sub-nuclear physics (Global climatic changes, On the origin of the world) Nuclear energy (Safety culture, The operation of NPPs under market conditions, Beyond design basis accidents, Completion of MochovceNPP 3, 4)

SNUS co-operates with the Information Centres at Bohunice and Mochovce NPPs and with schools in explaining nuclear energy to students. Also of significance is our co-operation with our strategic partners (ENEL SE, a.s., VUJE a.s.), particularly with regard to the creation of suitable conditions for the activities of their employees within SNUS. We also co-operate closely with the senior management of our other collective members.

SNUS publications

In 2005, SNUS prepared the publication ***The Development of Nuclear Energy and its Acceptance by the Public*** for the former Slovak Electric Co., which summarised the reasons why nuclear energy is an irreplaceable power source in Slovakia and globally and how to influence politicians, the media and the public to recognise the advantages of nuclear energy and support its development.

The book ***The Atoms in Slovakia*** is currently undergoing preparation for publication. It has an encyclopaedic character and charts the development of nuclear physics, technology and nuclear medicine in Slovakia. Extensive space is also given to the development of nuclear power.

SNUS events

In 2005, SNUS promoted nuclear energy at the following events:

- CONECO – Racioenergia conference held on 6.4.2005 in Bratislava
- the ***Role of Nuclear Energy in the Energy Policy of Slovakia and the EU*** conference held in Bratislava from 10.-12.10.2005.
- EXPO FUSION, from 7 - 19.11.2005, held in Bratislava – in the hall of the Law Faculty at the Commenius University

NucNet:

SNUS selects news from the international news agency NucNet and translates basic news and translates any article that it believes is of interest to its members and then distributes them to subscribers. Selected up-to-date news is published in its ***Bulletin***.

SNUS has issued a position statement regarding the following issues:

- the shutdown of the V-1 NPP units, November 2004,
- the energy policy of the Slovakian Republic, February 2005,
- lifelong education in the field of the "nuclear disciplines," June 2005.

SNUS is a member of the Association of Slovak Scientific and Technological Societies. It co-operates closely in all its activities with its affiliated organization – the Slovak Nuclear Forum. On an international level it collaborates closely with the European Nuclear Society (ENS), of which it is a collective member and also with the nuclear societies of neighbouring Central European countries (e.g. Austria, Hungary, Slovenia, the Ukraine and Poland). SNUS has very good relationships with the US and Canadian nuclear societies, which have been established on a contractual basis.

The Slovak Nuclear Society has been very active in promoting itself in the past and has given its views on pressing current questions with regard to the use of ionizing radiation and nuclear energy. However, it is always possible to improve our activities, particularly with regard to an ever more extensive involvement of all our members in those activities. I should like to thank all our active members and their management - who allow them to carry out this far from easy work at their workplaces.

Prof. Vladimir Slugen, PhD.
SNUS chairman
June 2006

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Fax: +421 33 599 1060,
info@snus.sk, http://www.snus.sk

http://www.euronuclear.org/e-news/e-news-13/israel.htm

MEMBER SOCIETIES

Elections for the new Council of the Israel Nuclear Society

The elections for a new Council of The Israel Nuclear Society produced the following results as from March 2006:

President:	Yigal Ronen
Vice-President:	Louis Tepper Int. Relations
Council members:	Zeev Alfassi Yaakov Barnea Ezra Elias Barak Tavron Ilan Yair

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http://www.euronuclear.org/e-news/e-news-13/INYC-2006.htm

MEMBER SOCIETIES

International Youth Nuclear Congress 2006

18-23 June 2006 Stockholm – Olkiluoto

Photographer: Peter Larsson
Picture: International Youth Nuclear Congress 2006, Technical Tour

The **International Youth Nuclear Congress (IYNC)** met in Stockholm, Sweden, from 18 to 23 June 2006 for the IYNC2006, the forth biannual youth congress. Over 414 participants from 52 countries attended the congress. The IYNC 2006 sets a new standard in terms of number of participants. The first IYNC in Bratislava, Slovakia, attracted 290 participants from 29 countries followed by 248 participants from 37 countries in Daejong, South Korea in 2002 and 263 participants from 35 countries in Toronto, Canada in 2004.

On Sunday 18 June, a welcome reception at Stockholm City Hall (better known as the location where the Nobel Prize ceremony takes place) kicked-off the conference. The following day, the opening session was hosted at Stockholm Opera House. The opening session was launched with a keynote presentation by Mr. Luis E. Echávarri, Director General (NEA/OECD), followed by a series of presentations by invited speakers including: Mr. Robert Workman (IAEA), Mr. John Polcyn (Bechtel Power Corporation) and Mr. Per Jander (WNA). Young Members of the European Parliament and professionals then gave their vision of nuclear's future in a panel session moderated by Mr. John Shepherd from NucNet. The opening session ended with a press conference where a declaration from the youth in the nuclear industry entitled IYNC Nuclear Science & Technology was presented to the media. The Declaration urged world leaders to: acknowledge the contribution that nuclear energy makes – as part of an overall energy mix that includes renewables - to combating climate change, to recognise how nuclear science and technology can help meet the social, economic and environmental objectives that underpins global sustainable development and to embrace a nuclear tomorrow.

Two and a half days were then devoted to a very high-level technical programme, which was divided into four parts: nuclear science and technology, nuclear waste and decommissioning, non-power applications of nuclear and nuclear politics and economics. Each track featured keynote speakers, including the ENS President, Dr. Franck Deconinck; industry leaders such as Bertrand Barré, AREVA, Dr. Lars Hallstadius, Westinghouse, university professors (Dr. George Bereznai, University of Toronto, Dr. Risto Tarjanne, Lappeenranta University of technology), and Dr. Peter J. Gowin from the IAEA. During the various track sessions, young nuclear professionals presented their papers. Meanwhile, workshops on different subjects (Chernobyl, knowledge management, professional technical organisations, waste management: the Nordic approach, and the politics of sustainable development) were organized in parallel, as well as a poster exhibition.

On 22 June, a technical tour was organised to the Olkiluoto nuclear site in Finland. The visit consisted of a one-hour sightseeing tour on a bus, during which participants had the opportunity to have a glance at the two existing units, the waste repository and the third unit (EPR) under construction. Representatives from TVO and Posiva presented their company's involvement in the nuclear site. The impressive and interactive visitor centre was also one of the highlights of the day, since it enabled

young nuclear professionals to discover more in depth the technology used at Olkiluoto.

Meanwhile, the IYNC Board decided that the next IYNC in 2008 will be held in Interlaken, Switzerland, in September 2008. Make sure you don't miss it! In addition, a new IYNC Network President was chosen, Ms. Lisa Stiles-Shell from the US.

For further information, please contact Martin Luthander, IYNC General Co-Chair, martin.luthander@vattenfall.com or go to the IYNC website at: www.iync.org.

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http://www.euronuclear.org/e-news/e-news-13/mep.htm

MEMBER SOCIETIES

MEP Forum discusses economics of nuclear energy

The latest meeting of the MEP Forum for the Future of Nuclear Energy took place on 18 May 2006, in Strasbourg, under the chairmanship of MEP Terry Wynn (UK, PSE). On the agenda was a discussion about the economics of nuclear energy. The two guest speakers who addressed attendees were Stephen Thomas from the University of Greenwich and Prof. Alfred Voss from Stuttgart University. Each presented his own, differing, views on the competitiveness of nuclear energy.

Stephen Thomas spoke first and began by stressing that the economics of nuclear energy are controversial because forecasts are usually overly optimistic and made by people with a vested interest in nuclear energy. In addition, the record of such forecasts is generally quite poor as there is very little data on actual construction and operation costs. Thomas added that nuclear power is capital intensive and that in a competitive market situation the cost of capital is very high. As a result, the liberalisation of the electricity market is a bad thing for the nuclear industry. In his view, more than just political support is needed for a nuclear revival to really take place; plant owners need guarantees that commercial and technical risks will not impact upon them negatively. In conclusion, Stephen Thomas argued that some costs, like the cost of waste disposal and decommissioning, can only be guessed at because there has always been a distinct lack of experience in this area. Furthermore, Thomas said that the nuclear sector is facing a skills shortage that will prove to be a considerable obstacle to the further development of nuclear power.

Prof. Voss then took the floor. He gave a comparative analysis of the electricity generation costs of different energy options. For nuclear power, it is the construction costs that are the largest cost contributor. However, he added that from a cost perspective generating electricity from nuclear is more competitive than that generated from gas, lignite, and hard coal - and much more competitive than wind power.

Prof. Voss stressed that investors in the power generation sector face three types of risks in a liberalised market: electricity price and volume risks, fuel price risks and

political and regulatory uncertainties due to market interventions such as subsidies, taxes, safety regulations or emissions controls. Taking into account the profit return on investment that can be had and the internal rate of the return on investment, Prof. Voss concluded that investments in nuclear energy sector are profitable and that nuclear energy can indeed be competitive in a liberalised market.

After the presentations the floor was open to questions and comments from MEP's. Many questions focused on the issue of decommissioning and the cost of waste disposal. Many MEP's wondered how Member States will ensure that the money set aside for this purpose will actually be made available and will be adequate. They also questioned who should pay for disposal and whether it would require public funding.

The issue of lack of investment in nuclear was raised and a question about the invisibility of the nuclear renaissance was also asked. MEPs were also interested in the availability of uranium and about whether knowledge and expertise in the nuclear sector was being slowly eroded. In answer to some of these questions, Stephen Thomas said that a monopoly situation would be the best scenario for nuclear investors because consumers would then pay for everything. With regard to uranium availability, he acknowledged that there are enough supplies to meet current levels of nuclear energy production for a long time to come, but added that current levels could not help to curb the effects of global warming. To tackle this issue adequately, according to Thomas, new breeder reactor technology would be needed, which would raise concerns with regards to the problem of proliferation.

Prof. Voss responded differently to these questions. He said that in the figures he presented the costs of decommissioning and waste management were included and that in many countries a part of the electricity bill that consumers pay goes to a special fund for decommissioning and waste management. He further argued that there is no noticeable nuclear revival because investors fear political and regulatory instability. Investments in other energy technologies occur because they are subsidised.

Terry Wynn thanked the speakers for provoking a lively and informative debate.

Another MEP Forum debate is planned for September.

For more information on this file, contact Stella Brozek: stella.brozek@foratom.org

http://www.euronuclear.org/e-news/e-news-13/gorleben.htm

EUROPEAN INSTITUTIONS

MEPs' fact-finding mission to Gorleben

On 8 June 2006, a cross-party group of 12 MEPs and two MEP assistants, accompanied by senior officials of the Regional Government of Lower Saxony, nuclear industry representatives and a 7-strong party from FORATOM, visited the GNS (Gesellschaft für Nuklear Service) facilities at Gorleben, Germany.

from left to right: Dr. R. Linkohr (TREN), E. Herczog (MEP), A. Vidal-Quadras (MEP), P. Uhlmann (E.ON), C. Eberl (Staatssekretär)

The Competence Centre for Nuclear Waste Disposal facilities at Gorleben (the site was selected by Germany's Federal Government from among 26 proposed locations) is one of four GNS sites in Europe – the others being at Plzen (Czech Republic) and Creys-Malville and Maubeuge (both in France). GNS is a joint venture involving four shareholding companies that participate financially in the enterprise: E-ON (48%); RWE (28%), SNE (Süwestdeutsche Nuklear-Entsorgungsgesellschaft mbH - 18.5%) and Vattenfall (5.5%). GNS has four subsidiary companies that it partially or totally owns: BLG (Brennelementlager Gorleben GmbH) and BLZ (Brennelement Zwischenlager Ahaus) are specialised in the storage of spent fuel rods and high-active waste and have operations in Gorleben and Ahaus respectively; WTI (Wissenschaftlich Technische Ingeieurberatung GmbH) that provides technical expertise and consultancy services in the field of engineering and DBE (Deutsche Gesellschaft zum Bau und Betrieb von Endlagern für Abfallstoffe), which is specialised in the construction of storage facilities for radioactive waste and is the major partner in the salt mine operations.

Historical overview

Before visiting the facilities, the visitors were given a detailed overview of the history of spent fuel and radioactive waste management in Germany and of the Gorleben project. The political developments – at local, regional, national and international levels - that have shaped Gorleben's history since it was first developed were of particular


A. Vidal-Quadras (MEP)

interest to the MEPs and their assistants. In Germany, although the nuclear industry is responsible for the transport, interim storage, reprocessing and preparation for final disposal of spent nuclear fuels, it is the Federal Government that is responsible for the exploration, construction and operation of a final repository. However, it is the German nuclear industry that has to finance the exploration, construction and operation part of the equation.

The Gorleben facilities were originally intended to house a reprocessing site for spent nuclear fuel, an interim storage facility, a pilot conditioning plant and a site for a final repository for radioactive waste – in the Gorleben salt dome. However, in 1979, the plans to build the reprocessing plant at Gorleben were shelved for political reasons. A project to build a reprocessing plant in Wackersdorf (Bavaria) was also abandoned and all spent fuel produced in Germany was to be sent to La Hague (France) and Sellafield (UK).

Red-green coalition imposes moratorium

Chancellor Schroeder's "red-green" coalition came to power in 1998. The new, essentially anti-nuclear government replaced the concept of a centralised interim storage facility with that of decentralised interim storage units at every nuclear power plant. This was done in order to avoid the problem of transporting spent nuclear fuel within Germany, which had become a much publicised cause célèbre among green activists bent on stoking up anti-nuclear public opinion. Instead, all high active waste from the reprocessing plants abroad was to be shipped to Gorleben.

In 2000, the German Government then suspended all the exploratory work going on into a deep geological final repository at the Gorleben salt dome, declaring a moratorium for a period of between 3 and 10 years (it is due to continue to 2010). The objective of the moratorium was to give all parties the chance to "clarify open questions" regarding a final repository. Although all those questions had been answered by the end of 2005, and the viability of a final repository 800m below ground in the Gorleben had been proven beyond all reasonable doubt, the moratorium has remained in place – for ostensibly political reasons. In fact a detailed assessment of the facilities, which was confirmed by the Federal Government, found absolutely no grounds whatsoever to suggest that Gorleben is not an ideal location. Consequently, the consensus view is that is no need to search for an alternative site somewhere else in Germany.


Staatssekretär C. Eberl

Experimental work goes ahead

In spite of the moratorium, experimental work into conditioning and interim storage stills continues at Gorleben, albeit it on a smaller scale than before. There are already around 68 special casks (called CASTOR containers) containing vitrified high active radioactive waste housed in the transport container area of the GNS interim storage facilities and another shipment is due to be stored there later in the year. Each cask satisfies the strict safety standards imposed by IAEA and controlled by EURATOM. There is room for a great deal more containers before the maximum capacity of 420 is reached.

Further experiments and geological work is still being carried in Gorleben by DBE in the miles of underground galleries in the salt dome. This work has further confirmed that salt is an ideal repository medium for spent fuel and vitrified high active waste.

As far as the separate issue of reprocessing is concerned, since the German Nuclear Power Act ("Atomgesetz") came into effect in July 2005, it has been banned at all German power plants and spent fuel now has to be directly disposed of in a final repository after being stored in the interim storage facility and conditioned.

Visit and Workshop

After arriving at Gorleben the visitors listened to introductory remarks from Prof. Dr. Hartkopf, a member of the Managing Board of EnBW; Dr. Hans-Heinrich Sander, Environment Minister in the Regional Government of Lower Saxony; Dr. Peter Haug, Director General of FORATOM and Dr. Kleeman of BFS (Germany's Federal Office for Radiation Protection).

The tour of the facilities proper began with a visit to the pilot conditioning plant and the interim storage facilities for spent fuel and high-active waste, as well as for low and medium active waste.

After the tour was over, participants took part in a Workshop entitled Waste Management at Gorleben, Myth and Reality, which was organised by FORATOM. During the Workshop participants, especially the MEPs present, gave their views on some of the important political issues at stake. Ute Blohm-Hieber (Head of Unit, Nuclear Energy, DG TREN, European Commission) and Simon Webster (Head of Unit, Nuclear Fission and Radiation Protection, DG Science and Research, European Commission) then gave presentations on EU nuclear energy and research policy. Dr. Bruno Thomauske, Managing Director of Vatenfall Europe Nuclear Energy then exposed some of the myths surrounding Gorleben and gave an update of the current state of affairs. Finally, Dr. Christian Eberl, Secretary of State at the Environment Ministry of the Regional Government of Lower Saxony gave a political appraisal from a Regional Government perspective.

After the Workshop, a lively dinner debate followed during which MEPs from all sides of the political spectrum – including a Green Party MEP – questioned the speakers and exchanged views with the other participants.

from left to right: Dr. P. Haug (Foratom), K.-D. Grill ex MdB, Dr. M. Flachsbarth MdB

Raising awareness, applying political pressure

The objective of this fact-finding mission was to sensitise European politicians to the state-of-the-art work that GNS is carrying out at Gorleben and to the effective solutions that it offers with regard to the conditioning, interim storage and long-term geological storage of high active waste and spent fuel. Hopefully, visits of this kind will help raise awareness among national and European politicians of the assets of the Gorleben facility. Hopefully, they will help to accelerate the whole nuclear debate in Germany and publicise the economic, social and environmental aspects of the work that is being carried out at Gorleben. Above all, they can help put pressure on the Federal Government in Germany to lift the current moratorium on the Gorleben operations and to kick start Germany's dormant radioactive waste management and storage programme. Time will tell.

One fact that was obvious was that Gorleben could quite easily be made "fully operational" and that assuming that exploration was resumed quickly, final storage in the salt dome could be a reality by 2025.

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http://www.euronuclear.org/e-news/e-news-13/itre.htm

EUROPEAN INSTITUTIONS

ITRE Committee votes on amended Euratom FP7 budget

The EP's Committee on Industry, Research and Energy (ITRE) held a second round of voting on Euratom FP7 on 30 May. The second round of voting was restricted to budgetary amendments. In the case of Euratom FP7, there were only two amendments tabled - Compromise Amendments 2 & 3 (CA2 and CA"). The compromise amendments were tabled by the EPP-ED, PSE, ALDE and GUE groups.

CA 2 called for the global Euratom FP7 budget to be reduced to EUR 2751 million. The original EC Proposal was EUR 3092 million. This 11.02% reduction was proposed because of the overall reduction of the EU's budget in line with the

financial perspectives that were recently agreed between the European Council, the EP and the EC. The EUR 2751 million figure is also in-line with what the EU Presidency (Austria) proposed at the Council. The EUR 341 million reduction "won" by the EP during the recent negotiations on the financial perspective was re-distributed within the general FP7 programme.

CA 3 dealt with the budgetary allocation to "fusion energy research", "fission and radiation protection" and "nuclear activities of the JRC" under Article 3. The break-down is as follows:

	Figures proposed by the EC	**Figures proposed by the EP**	**Difference**
Fusion energy research	2159	1947	- 9.81%
Nuclear Fission and radiation protection	394	287	-27.15%
Nuclear Activities of the JRC	539	517	- 4.08%
Total	3092	2751	- 11.02%

The Parliament's ITRE Committee adopted both CAs without any major opposition. However, it should be noted that when the CA 3 was under debate within the EPP-ED group (prior to the vote), there was major disagreement about how to redistribute the funds under Article 3. The group was split on the question of whether the funding for "fusion energy research" should be maintained - as proposed by the EC - or decreased even more than the amount proposed in CA 3. Because it was a compromise amendment, there was no possibility of having a split vote. The entire Euratom FP7 Draft Opinion was then adopted by the ITRE Committee as follows: 33 in favour, 4 against (the Greens) and one abstention.

However, since the vote, a new amendment has already been tabled by MEPs who were unhappy with the redistribution of funds under Article 3. This is how the new amendment redistributes the funds:

	Figures proposed by the EC	**Figures proposed by the MEPs**	**Difference**
Fusion energy research	2159	1947	- 9.81%
Nuclear Fission and radiation protection	394	317	-19.54%
Nuclear Activities of the JRC	539	487	- 9.64%
Total	3092	2751	- 11.02%

Essentially, the new proposed amendment redistributes funding between "nuclear fission and radiation protection" and "nuclear activities of the JRC". In order for the amendment to be considered at the next plenary (14 June), it needs the support of a political group, e.g. the EPP-ED group or at least 32 MEP signatures. As things stand at the moment, the amendment already has more than the 32 signatures required for it to be tabled at the Plenary. Of course, the more signatures there are the better. FORATOM's Secretariat will continue to seek support from key MEPs across the political spectrum in order to gain the necessary support for a successful vote in the Plenary on 14 June. It is doubtful if there is enough support within the EPP-ED group to have the amendment tabled by the group as a whole. However, FORATOM's Secretariat will also continue to lobby in parallel to achieve this. Another alternative

would be to get the EPP-ED and PSE groups to hold a "free-vote" on the amendment, i.e. MEPs would be free to vote whichever way they want and not have to follow officially party lines. The deadline for tabling amendments for the mid-June plenary is 7 June.

In parallel to the debate in the EP, the Council has also been debating how to distribute funds under Euratom FP7. On 30 May, Austria blocked an EU resolution on 2007-13 nuclear research spending, insisting that the money for nuclear fission be exclusively used for safety and related fields. In fact, Austria is opposed to the reduction of the JRC's budget allocation for activities related to Generation IV (Austria wants to limit JRC's contribution to GEN IV to safety and security R&D alone). They also want to split the "fission and radiation protection" budget in order to get a dedicated budget for radiation protection. However, Austria is apparently willing to give up the latter demand if a solution is found on JRC/GEN IV. The Council reached an acceptable compromise on 29 May, but then decided to reject its own compromise. Austria's demand met with resistance from other Member States, particularly the United Kingdom. There is now considerable pressure for a solution is found by the end of the Austrian Presidency.

Although the EP does not have co-decision power with regard to Euratom FP7, i.e. the Council does not have to consider the EP's Opinion, the EP can bring considerable political influence to bear, which just might help break the current deadlock within the Council.

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http://www.euronuclear.org/e-news/e-news-13/insc-news.htm

ENS WORLD NEWS

Providing for Our Energy Future While Protecting our Environment

A Statement by the International Nuclear Societies Council - May 2006

To assure the sustainability and reliability of the world's long-term energy supply, the International Nuclear Societies Council (INSC)* calls upon the G8 Heads of States and Governments to encourage the deployment of advanced nuclear power stations and pursue an aggressive international development program of fast neutron reactors to assure future long-term uranium supply and efficiently manage nuclear wastes.

At the Gleneagles meeting, in July 2005, the Heads of States and Governments of the G8 countries acknowledged the clear and present danger of climate change due to the release of greenhouse gases (GHG) in the atmosphere in the course of human

activities and notably of the burning of fossil fuels, oil, coal and gas, which today account for 80% of the world's primary energy consumption.

Energy is the life-blood of survival and development. Studies carried out under the auspices of the UN agencies WHO and UNDP have underlined that without minimal access to energy, there is no human development, sustainable or not. In 2000, 6 billion inhabitants of planet Earth consumed the energy equivalent of 10 billion metric tons of oil (10 Gtoe). In 2006, 6.5 billion people will consume 12 Gtoe, and yet 1.6 billion have no access to electricity. By 2050, 8 to 9 billion human beings will probably consume annually between 15 and 18 Gtoe.

Where this energy will come from is an unanswered question. Fossil fuels, especially oil and gas, even though they currently provide a dominant fraction of the world's energy, are finite resources that even now are showing signs of supply restrictions and price increases. Furthermore, a policy of continued dependence on fossil fuels would be unsustainable because of the negative, possibly disastrous, impact on the environment.

Accommodating the needs and aspirations of a growing global population, while at the same time cutting by half the world's emissions of carbon dioxide, will prove a formidable challenge - but we must face it or expose mankind to unacceptable risks. The stakes are huge and the time is now. Only a full array of measures can meet such a challenge. These measures include:

1. Control the energy demand in the industrialized and emergent nations by aggressively increasing energy efficiency and promoting thrifty ways of life;

2. Increase, within the diversified energy mix, the share of those energy sources that emit very little CO_2 during their life cycle, namely nuclear power and renewable energies, which, together, account today for a mere 10% of the world energy production (another 10% is supplied by traditional biomass, the contribution of which is unlikely to increase);.

3. Implement wherever reasonably feasible carbon sequestration at those facilities which emit large amounts of CO_2.

Conservation and renewables are the politically easy solutions to support. However, nuclear energy, despite the fact that it now provides 16% of the world's electricity cleanly, does not have international support as a way to help meet our future energy and environmental needs. It is urgent to realize that, while nuclear, by itself, is not ***the*** solution, there is no realistic solution at all ***without*** nuclear power.

Countries that have the capability to use nuclear power safely and economically, but have elected to forgo this use, are actually emitting more CO2 into the environment than needed, and consuming more fossil fuels than needed. They are depleting resources and putting pressure on fuel prices, to the detriment of those poorer and less industrialized countries for which nuclear power is not yet an option. The INSC calls on those countries to seriously reconsider their policies and priorities, to encourage greater development of safe nuclear energy, and to support strongly the efforts of other governments to do the same.

Today, nuclear power is devoted almost exclusively to generating electricity. New types of reactor design under development could open the field to non-electrical

applications, notably transportation through clean production of hydrogen, and desalination. Currently 97% of the energy used for transportation comes from oil.

Today there are several new types of advanced reactor ready for deployment— designs that have improved safety and economic performance. In addition, there are smaller advanced reactors under development that are suited for developing nations that do not need large nuclear power stations. Should the deployment of nuclear power stations expand as expected, care must be taken that its development be sustainable, and not limited by uranium availability.

Nearly all current power reactors are "thermal"— they use thermal neutrons, and therefore extract less than 1% of the energy in the mined uranium. The remainder of the energy is left unused in the spent fuel and in the depleted uranium that remains after uranium is enriched for use in thermal reactors. With known fast-neutron reactor technology, this unutilized energy can be harvested, thereby extending a hundredfold the energy extracted from the same amount of mined uranium. Spent fuel from thermal reactors and depleted uranium from the enrichment process can be utilized in fast-neutron reactors; the energy that can be extracted from this alone would be sufficient for several hundred years without additional mining.

Fast neutron reactors with advanced fuel cycle facilities also can recycle transuranic elements, thus reducing significantly the long-lived radioactive waste and therefore facilitating the acceptability of radwaste disposal sites.

To assure the sustainability and reliability of the world's long-term energy supply, the International Nuclear Societies Council sees an urgent need to deploy safe and proven thermal-neutron reactors and to commit to an international program to develop fast neutron reactors and advanced proliferation-resistant fuel cycle facilities such that the long-term energy contribution from clean nuclear power can be assured.

INSC MEMBER SOCIETIES

- American Nuclear Society (ANS)
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- Associação Brasileira de Energia Nuclear (ABEN)
- Atomic Energy Society of Japan (AESJ)
- Australian Nuclear Association (ANA)
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  - Danish Nuclear Society
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  - Finnish Nuclear Society
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- Société Française d'Energie Nucléaire
- Spanish Nuclear Society
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- Swedish Nuclear Society
- Hungarian Nuclear Society
- Swiss Nuclear Society

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