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No 15

The ANS Globe

...e-news from the ANS International Committee

From the editors

The ANS Globe is the Bulletin of the American Nuclear Society's International Committee. *The ANS Globe* has as its mandate the dissemination of news of international interest to International Committee members and to others.

We would like to keep *The ANS Globe* current and relevant. Please send us your letters, articles, news and/or comments for consideration towards the next issue.

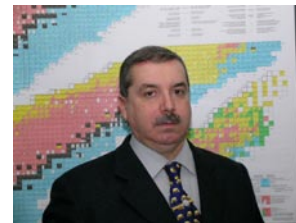
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The people of Japan, our Japanese colleagues and the workers at the crippled Fukushima Daiichi NPP are and continue to be in our thoughts following the disastrous 9.0-magnitude earthquake and subsequent tsunami which hit Japan on March 11, 2011.

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From the Chair



Dear Friends,

We have all been affected by the dramatic events that occurred last March to the Japanese people, with worldwide consequences. Its nuclear industry was directly affected locally with severe damage to several nuclear units.

Among multiple consequences of the Fukushima Daiichi accident, in particular at the international level, one could notice how strongly and rapidly, with great solidarity and empathy, the cooperation between governments, nuclear agencies as well as nuclear research and industry organizations, has been and is currently dramatically intensified worldwide.

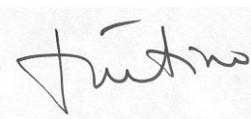
At a Special Session of the OECD recently, the [IAEA Director General Yukiya Amano](#) stated: "More than ever before, our watchword must now be Safety First" and in order to foster international discussion and exchanges, he has proposed "that an IAEA Ministerial Conference on Nuclear Safety take place from June 20 to 24 in Vienna. The Conference... is likely to make a preliminary assessment of the Fukushima Daiichi accident, to discuss ways of strengthening emergency preparedness and response, and to review nuclear safety generally."

At the same time, industry leaders agreed - at the World Nuclear Fuel Cycle Conference in Chicago - that the nuclear power industry will change in the years after Fukushima but the need for the technology will not... and the [World Nuclear Association Director General, John Ritch](#), noted: "Industry mechanisms exist to address the challenges in the form of the US Institute of Nuclear Power Operations and its global sister the World Association of Nuclear Operators... with the combined experience of the global industry."

With these strengthened institutions "...we must meet the further and compelling challenge of... presenting in accurate and persuasive terms, the measures by which the industry is acting, on a broad front... against the recurrence of any such accident, anywhere."

With a similar demanding approach to communicating with the public, the Society has played and is playing a vital role as a source of credible, unbiased technical information for the media, policymakers, and the public. Our [President, Joe Colvin](#), emphasized that "the time and talent of members are the Society's most valuable resource, and this important intellectual capital is disseminated to diverse audiences around the world."

Let us continue to enhance this capital while sharing expertise and technical knowledge with our international partners for a brighter future.



France Brès-Tutino

In Memoriam: Clarence Hardy

The ANS Globe learned with great sadness that our esteemed colleague Dr. Clarence Hardy passed away suddenly on April 18 in Sydney, Australia. On behalf of the ANS International Committee, *The ANS Globe* would like to express sincerest condolences to Mrs. Mollie Hardy and to her entire family.

Dr. Hardy was a great friend of the ANS International Committee and made incalculable contributions over many many years to international nuclear activities. Most recently Dr. Hardy had served as President of the Pacific Nuclear Council, and was instrumental in bringing the 16th Pacific Basin Nuclear Conference to Sydney in October 2006. Dr. Hardy also served for a very long time as Secretary of the Australian Nuclear Association.



Dr. Hardy had two science doctorates. He had held senior positions in many organisations for over 30 years, for example at the National Nuclear Laboratories in Harwell, UK, at the Oak Ridge National Laboratory in the US, and at the Lucas Heights Research Laboratories in Australia. Dr. Hardy had been the Chief Scientist for the Nuclear Fuel Cycle in the Australian Atomic Energy Commission (AAEC), with responsibility for oversight of all nuclear fuel-cycle programs, including the extensive uranium-enrichment program. When the AAEC was replaced by the Australian Nuclear Science and Technology Organisation in 1987, Dr. Hardy was appointed Director of Industrial Technology. In 1996, 5 years after his retirement from the AAEC, Dr. Hardy published a history of AAEC's enrichment program. In 1999 he followed this with a wider history of the AAEC.

The ANS International Committee's Web Page

Visit the enhanced ANS International Committee's Section on the ANS website, located at <http://www.ans.org/const/international>. It includes:

- Background information about the ANS International Committee
- Connections to ANS International Local Sections
- An overview of Society alliances with international organizations (INEA, INSC, and PNC), along with contact information
- Connections to 30 ANS Agreement Societies/Organizations, and
- Current/back issues of *The ANS Globe*, which features ANS International Committee activities and related items.

News from Sister Societies and International News

- Austria Local Section of ANS (<http://local.ans.org/austria/>)

The American International School's career day was held 2011 March 4. Stephen Schultz and Sahak Margossian presented information on careers in the nuclear field and supplied informational items from the ANS.

- Canadian Nuclear Society (CNS) (<http://www.cns-snc.ca>)

The 5th International Symposium on Supercritical-Water-Cooled Reactors (ISSCWR-5) was held with great success 2011 March 13-16, Vancouver, British Columbia., <http://www.cns-snc.ca/events/isscwr-5/>

This was the first of a number of major international conferences which are being organized and hosted by the Canadian Nuclear Society in 2011. It is being followed by these events:

- The 32nd CNS Annual Conference and 35th Annual CNS/CNA Student Conference, 2011 June 5-8, Niagara Falls, Ontario, <http://www.cns-snc.ca/events/conf2011>
- CNS Conference on "Waste Management, Decommissioning and Environmental Restoration for Canada's Nuclear Activities", 2011 September 11-14, Toronto, Ontario, <http://www.cns-snc.ca/events/waste-management-decommissioning-and-environmental/>
- NURETH-14, 14th International Topical Meeting on Nuclear Reactor Thermalhydraulics, 2011 September 25-29, Toronto, Ontario, <http://cns-snc.ca/events/nureth-14/>
- CNS "Conference on the Future of Heavy-Water Reactors", 2011 October 2-5, Ottawa, Ontario, <http://www.cns-snc.ca/events/cns-fhwr/>
- The 9th International CANDU Maintenance Conference, 2011 December 4-6, Toronto, Ontario, <http://www.cns-snc.ca>



The CNS Executive is changing at the time of the Annual Conference in June. At the time of this writing, it is known that Frank Doyle, of the CANDU Owners' Group, will be the **CNS President for 2011-2012**, while John Roberts, Consultant, will be **First Vice President**.

Frank Doyle, CNS President

- Chinese Nuclear Society

Zhengfeng Ma, staff member of the Chinese Nuclear Society, sends the following information about meetings in China:

- 1st China International Conference on Nuclear Power Plant Instrumentation and Control (NPIC-2011), Beijing, China, 2011 May 25-27



- 2011 Water Reactor Fuel Performance Meeting (WRFPM 2011), Chengdu, China, 2011 September 11-14
- 2011 Annual Conference of the Chinese Nuclear Society, Guiyang, China, 2011 October 11-14
- [France](#)

[ANS French Section \(http://local.ans.org/france\)](http://local.ans.org/france)

Enhancing Relationship between the USA and France in the Field of Nuclear Education and Training

At the invitation of the ANS French Section, about thirty U.S. nuclear engineering professors from different major Universities met with French nuclear senior executives for a seminar held in conjunction with the Las Vegas Winter Meeting, last November. Aimed at enhancing cooperation between U.S. and French nuclear industry in the field of education and training, the seminar has actually been very successful and fruitful on both sides.



French Section **Vice Chair Michel Debès** giving a presentation at the seminar with US Nuclear Engineering

Presentations by EDF, AREVA, INPO representatives, as well as [Prof. Brian Hajek](#) of the Ohio State University were very well received. Everyone remained well engaged during the meeting and offered valuable insights. The French Section was represented in particular by [Chair Jean-Claude Gauthier](#), [Vice Chair Michel Debès](#) and members [Bernard Jolly](#) and [Dominique Grenèche](#), who has been in charge of previous nuclear “Tour de France”.

It is important to note that professors who had done during several previous years this “Tour de France” - i.e., an intensive one-week visit of major French nuclear facilities - had extremely positive feedback: several professors gave presentations in different Universities, in ANS Local Sections and branches on the French Nuclear Program, moreover one even called this Tour, a “life-changing experience”! Based on this, one could conclude that these tours have proven to be worthwhile.



[Ann Winters](#) of INPO gave a presentation on approaches for standardization of curricula for nuclear training and education programs. She noted that training is critical as there is recognition of an aging workforce.”

To sum up the meeting, the attendees agreed upon the **following recommendations**:

- Encourage wider participation in the ANS poster contest for students – this is open to international students.
- Participate in the ANS student group gathering at Georgia Tech on April 14, 2011.
- Encourage participation in the science and design contest sponsored by the ANS.
- Send representatives to attend the conference hosted by Texas A&M on January 10-12, 2011, on Alternatives Energies
- Name a French national representative to the ANS Education, Training and Workforce Division
- Organize a new Tour de France in 2012.
- Propose summer course for U.S. students in France which would include visits of nuclear sites and facilities.
- Establish more regular meetings with the ANS French Section
- Create Faculty exchanges between U.S. and French professors of nuclear engineering. It was suggested that the host institution would pay costs of visiting professors.
- Forge bilateral partnerships between French and U.S. universities or engineering schools. For example, students could experience a “semester abroad” in either the U.S. or France. Questions of accreditation and credit transfer were raised. Possible solutions were counting coursework as transfer credit or research credit.

In addition to these recommendations, the Group discussed the specific goal of **developing a cross-certification process** between the two education systems. That is very important in order to make possible future exchanges between students, with mutual recognition of credit for qualification as nuclear engineer.

The model currently developed by INPO and presented during the meeting could serve as a basis for establishing this cross-certification, which includes the following vision:

- . align work force development programs with industry demand
- . deploy standardized curricula
- . increase the efficiency of qualification
- . increase availability of new nuclear workers according to the ACAD 08-006 structure, which gives detail on the structure of the training course.

To progress towards this goal, which could be a long-term objective especially for the International Master's in Nuclear Energy, some more detailed comparison should be made to define the domains where complementary actions should be taken (book of the course, qualification...).

=> **As a first step**, if this challenge is endorsed, the role of the SFANS could be to favor more contacts between the French executives in charge of this Master's on the occasion of the next US professors' visit to France in 2012 and contacts have already been taken in this direction

=> **Another step** would be to favor some exchange of students, to gain insight in the respective training course and be able to identify the points needing further actions.

The SFEN Young Generation (French Nuclear Energy Society) Welcomes a Delegation of the North-American Young Generation in Nuclear (NA-YGN)

The SFEN Young Generation (www.sfenjg.org) was pleased to welcome a delegation of the North-American Young Generation in Nuclear (NA-YGN) in Normandie and in Paris.

On March 27, 2011, 5 members of the NA-YGN, accompanied by [Caroline Adolf](#), came from the AREVA site in Lynchburg (Virginia) to meet 7 members of the active young members from Normandie working in the nuclear field for EDF, AREVA and the DCNS. With the support of WIN Normandie (Women In Nuclear), the SFEN YG organized this meeting at a restaurant in Cherbourg. The friendly atmosphere was engaging for creating bonds and triggering exchanges.

Most of our American colleagues work in the engineering field; more specifically, on safety analysis studies, process, structure analysis, reload design and SG washing for the US existing plants as well as for the EPR™. The French participants had similar experience, although more operation-oriented.

The second day was dedicated to the visit of the EPR™ Flamanville construction site. After visiting the CIP (Centre d'Information du Public – Public Information Centre), our colleagues were granted the opportunity to assess the progress of the construction site and follow its evolution since the excavation work.



Our American colleagues on the FA3 EPR construction site:



The highlight of the day was a customized visit of the simulator building where the replica of the future Main Control Room of the EPR™ has been installed.

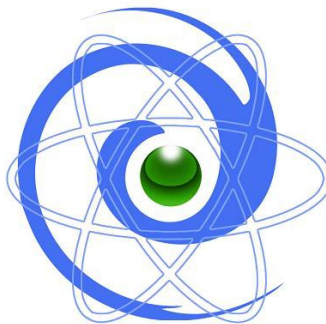
The American delegation then proceeded to the AREVA site in La Défense (Paris) to meet more colleagues and active SFEN YG members.

***The American delegation
and their French
colleagues in La Défense:***

This meeting offered the opportunity to discuss future collaborations between the SFEN YG and their counterparts from the NA-YGN. It was decided to meet again very soon. We appreciated the visit of our colleagues and welcome the numerous collaborative actions to come!



Atoms for the Future 2011 – “Fuel Cycle”



This fall 2011, the new edition of Atoms for the Future will take place in Paris, with focus on the “Fuel Cycle”.

With the same spirit as Atoms for the Future 2010, the event will be organized by the very motivated members of the French Nuclear Energy Society - Young Generation (SFEN-JG). It will be widely open to participation by students and foreign young professionals. Last year, we were delighted to welcome 60 young participants, coming from Sweden, Germany, Belgium, Italy, Czech Republic, United Kingdom, and of course France for visits of reactor-related sites. Afterwards, more than 120 persons gathered to listen to renowned speakers from AREVA, CEA, OECD, IAEA, EDF, GDF SUEZ,

WANO, etc., with presentations on reactor development over the last 50 years and in the future.

Atoms for the Future 2011 will consist of two days of conference and two days of site visits.

- The first day of conference will focus on the description of the fuel cycle today and in the future, dealing with the Front End, the Back End, and Final Disposal activities, while the second day will deal with issues such as economy and policy.
- Key French sites will be selected for visits, which should provide a representative illustration of the Fuel Cycle industry.

You can stay posted by registering for the mailing list, just by sending your e-mail to silvain.ikazaki@areva.com.

See you soon in Paris!!

[Silvain IKAZAKI](#)

Links to the 2010 and 2011 editions respectively:

<http://www.sfenjg.org/Atoms-for-the-Future-2010-The>

<http://www.sfenjg.org/Atoms-for-the-Future,27>

- [Ghana](#)

[Dr. Kofi Korsah](#), Senior R&D Staff Member, Oak Ridge National Laboratory, will be the ANS International Committee's Point-of-Contact with the Ghana Nuclear Society (GNS). [Dr. Korsah](#) will be looking at the respective GNS/ANS needs and potential activities for greater cooperation.

- [India Local Section of American Nuclear Society](#)
(<http://local.ans.org/india/>)

The inaugural meeting of the India Section of the American Nuclear Society was held 11 February 2011, at the Taj Mahal Palace Hotel, Mumbai.

[Corey McDaniel](#) of the ANS reported that the ANS officially awarded the India Section its charter at this meeting.

The Technical program included a presentation titled “Nuclear Energy: A Global Technology Choice”, by [Admr. John Grossenbacher, Director of the Idaho National Laboratory](#). [Gary Locke, U.S. Secretary of Commerce](#), was the honored guest, and [Paul Folmsbee, U.S. Consul General, Mumbai](#), was the honored host.

- [India \(http://www.ins-india.org\)](http://www.ins-india.org)

India Nuclear Energy 2011, Third International Exhibition and Conference

As of 2010, India has 20 nuclear power plants in operation generating 4,780 MW, while 5 others are under construction and are expected to generate an additional 3,900 MW. India's nuclear power industry is undergoing rapid expansion with plans to increase nuclear power output to 63,000 MW by 2032. Only nuclear energy offers emission free energy on the massive and expanding scale the world so urgently requires. Moreover nuclear energy is considered to be an environmentally benign source of energy.

India being a member of IAEA has agreements with several countries on various aspects of the nuclear fuel cycle. India stands 9th in the world in terms of number of operational nuclear power reactors. In October 2010 India's safeguards agreement with the IAEA became operational, with the Government confirming that 14 reactors will be put under the India Specific Safeguards Agreement by 2014.

Looking at the importance of nuclear energy to effectively bridge the energy gap for India, UBM India is pleased to announce its 3rd edition of **India Nuclear Energy 2011 – 3rd International Exhibition and Conference**, from 29 September 1 to October 2011 at Mumbai. India Nuclear Energy 2011 will provide a global platform for showcasing the latest cutting-edge nuclear technology and component-supplying companies, as well as raw-material suppliers.

More information can be found at <http://www.indianuclearenergy.net/introduction.htm>.

R.K. Singh, Secretary of the Indian Nuclear Society (INS), sent the following report this past December.

The Indian Nuclear Society Award function has been planned for the inauguration of Twenty First Annual Conference of the Indian Nuclear Society (INSAC-2010) with the theme “Impact of Radiation Technology on Human Health and Environment”, on January 17, 2011 in Mumbai. **Dr. K.B. Sainis, Director, BMG, BARC**, is the convener.

The Honorable Mr. Yukiya Amano, Director General, IAEA has kindly consented to be the Chief Guest of the award function and to inaugurate INSAC-2010.

The INS Awards Committee decided to confer the following Awards:

- INS HOMI BHABHA LIFETIME ACHIEVEMENT AWARD to **Dr. Anil Kakodkar**, DAE Homi Bhabha Prof. & Former Chairman, AEC & Secretary, DAE
- INS AWARD: Nuclear Reactor Technology, including Reactor Safety, to **Shri Dilip Saha**, Associate Director, RDDG & Head, RED, BARC, and **Shri K.B. Dixit**, Executive Director (Engg. & Procurement), NPCIL

- INS AWARD: Nuclear Fuel Cycle Technologies, including Radiation Safety and Environmental Protection, to [Dr. K.L. Ramakumar](#), Head, Radioanalytical Chemistry Division, BARC, and [Shri K.V. Kasiviswanathan](#), Former AD, MMG, IGCAR, Kalpakkam
- INS AWARD: Radiation and Radioisotopes related Technologies and their Applications in different areas including Medicine, Agriculture and Industries, to [Dr. A.K. Kohli](#), Chief Executive, BRIT, and [Dr. S.K. Shrivastava](#), Prof. & Head, Department of Radiation Oncology, Tata Memorial Hospital
- INS AWARD: High Technology - Nuclear Related Areas to [Shri G.P. Srivastava](#), Director, Electronics & Instrumentation Group, BARC, and [Dr. S.M. Sharma](#), Head, High Pressure Physics Division, BARC
- INS INDUSTRIAL EXCELLENCE AWARD to Heavy Water Board
- INS MEDALS to:
[Shri P.K. Singh](#), Reactor Safety Division, BARC, [Ms. R. Vijavashree](#), IGCAR, Kalpakkam, [Ms. Dipti Bhachawat](#), NPCIL, Mumbai, [Shri Sameer Hajela](#), NPCIL, Mumbai, [Shri Ravi Kumar Bansal](#), NAPS, Narora, [Shri Joseph Thomas](#) M., RMP, BARC, Mysore
- INS SCIENCE COMMUNICATION AWARD to:
[Dr. G.P. Kothiyal](#), OS & Head, Glass & Advanced Ceramics Division, BARC, [Shri S.K. Malhotra](#), Head, PAD, DAE
- [Italy](#)

Co-Editor [Mauro L. Bonardi](#) provides the following very recent (2011 April) news on the position of Italian Government following Fukushima-Daiichi accident

On April 19, 2011, the Italian Government introduced an amendment that will extend indefinitely a *moratorium* on the construction of new NPPs in Italy. Such construction was previously planned to start in 2013. The cabinet has been charged meanwhile with the formulation of a new energy strategy that takes into account "the position of the European Union and of competent International authorities" as regards nuclear energy in the period after the accident at Fukushima.

A spokesperson for *Forum Nucleare Italiano*, a non-profit organisation of nuclear enterprises, universities and unions, said that the amendment will halt the construction of new plants in Italy, but that it will stop neither the formation of a planned new national Agency for Nuclear Safety (see *The ANS Globe* of 2010 November) nor the identification of the location of a new nuclear technology park and a national waste store.

Public opposition to the nuclear program in Italy has been at an all-time high since the Fukushima accident, reaching 70% against, with a position that is opposite to the pre-Fukushima scenario. For the second time (i.e., post-Chernobyl 1987 and ahead of an after-Fukushima referendum planned for June 2011) the emotion against nuclear is

prevailing over rationality.

At the moment the overall consumption of electricity in Italy is 330 TWe.h (with peaks of 55 GWe of capacity in summer). And 45 TWe.h (14% of the total) are of *nuclear origin* and imported from abroad (mainly produced in France and triangulated to Italy through France, Switzerland, Austria and Slovenia, and in minimum amount from Greece). This electricity is imported mainly by night at low cost, and is used to implement the hydropower installed in Italy. A projection of 380 MWe.h is envisaged for 2020. The cost on the Italian market of electricity varies around 60 to 65 Euro/MWe.h, but the price for the final user (home demand, public transportation or companies), tax included, is 3 times higher, i.e. 0.20 Euro/kWe.h.

To complete the scenario, the Government was pushed strongly by the political opposition to invest large amounts of money in renewable sources of energy (already 3,5 billion Euro in 2010, 5 billion Euro in 2011 and probably some 7 to 9 billion Euro/year until 2020), in order to reach the 20% of the total in 2020. Caveat: one of the various taxes on the final cost of electricity, called A3, was established for boosting the State's support to the implementation of renewables, whose real high cost cannot be accepted by the free market.

In practice, in the next few years, Italy will invest to boost renewable sources (by an amount of money equivalent to the construction of 1 or 2 new NPP/year) with anti-economic energy sources such as solar PV and wind targeted. Regarding hydroelectricity, Italy has already reached saturation of such production, and a very small improvement of this source can be expected.

On April 26, [Prime Minister Silvio Berlusconi](#) announced that the present moratorium would be mandatory, on account of the increasing popular opposition after Fukushima, and also to pre-empt the anti-nuclear referendum of June 2011. However, he also remarked that Italy's future will in any case be related to nuclear energy, after harmonization of the energetic strategy with the other Countries of EU.

The Court of Cassation, Italy's Supreme Court, will now decide if the question on the nuclear program in the June 2011 referendum should be omitted. The amendment to the nuclear moratorium will be passed through the parliament for a final vote and should be converted into law at the latest by 31 May.

Italian energy leader company ENEL, which launched an equal-basis joint venture in 2009 with the French company EDF for feasibility studies and eventual construction of new reactors in Italy, had no comment to make on the government's decision.

A spokesperson for SOGIN, the company (in the ENEL Group) charged with decommissioning Italy's former NPPs and sites and locating the new national waste store and technology park, said that their work would not be affected by the present situation.

- [Malaysia](#)

[Professor Emeritus Dato' Dr. Noramly Bin Muslim](#), of the Faculty of Science & Technology, at Universiti Kebangsaan Malaysia (National University of Malaysia), reports that the government of Malaysia has announced the formation of the Malaysian Nuclear Corporation to spearhead the nuclear power program in Malaysia.

- [Morocco](#)

Professor [Oum Keltoum BOUHELAL](#), Moroccan coordinator for the ANS-AIGAM cooperation agreement of scientific exchanges, provided the following Summary of the AIGAM Activities and Scientific Exchanges - 2010

The ANS and AIGAM signed an Agreement of Cooperation and Scientific Exchanges in the field of the peaceful use of nuclear energy. This agreement was approved and signed by both parties in January 2003 for a period of five years. The agreement was renewed in January 2008. The present article summarizes the AIGAM scientific meetings and exchanges deployed during the year 2010.

Seminar on “Information on Nuclear Power and Nuclear Waste Management”

This seminar was held in Rabat on February 22, 2010, and was organized by the Ministry of Energy and Mines in cooperation with the IAEA, the national nuclear centre CNESTEN and the Moroccan electricity utility ONE. The presentations focused on issues related to the radioactive-waste management system and the opportunities for scientific exchanges between the AIGAM members and the organizations represented.

The 16th AIGAM Topical Meeting: “Teaching and Training in Nuclear Sciences and Technology: Situation and Perspectives”

This meeting was held in Rabat on May 22, 2010. The purpose was to summarize the situation of the nuclear sciences programs deployed in the universities and to outline relevant directions for improvement and new collaborations in the framework of the IAEA technical cooperation program.

Second Edition of the International Conference on Physics and Technology of Reactors and Applications, PHYTRA-2

The conference PHYTRA2 is being organized by the Moroccan Association of Reactor Technology (GMTR), and will take place from 26 to 28 September 2011 in the city of Fez. PHYTRA-2 follows the successful PHYTRA-1 conference, held in Marrakech in 2007. Several technical and cultural events are under preparation in order to achieve the same success as that of PHYTRA-1, which was attended by the ANS President and several other ANS members, as well as presidents and representatives of prestigious nuclear societies as the French Nuclear Society (SFEN), the Canadian Nuclear Society (CNS), the Japanese Nuclear Society (AESJ).

PHYTRA-2 is co-sponsored by the ANS Reactor Physics Division (RPD) and Mathematics and Computation Division (MCD), and is expected to be a premier international event. It is co-sponsored by several national and international organizations, as was the case for PHYTRA-1. The conference aims to provide an opportunity for researchers, academicians and practitioners from different countries to present their recent work in the field of physics and technology of reactors. Several topics will be covered and a panel on nuclear education will be organized during the three days. Information on registration, paper submission and accommodation can be found on the GMTR web site, www.gmtr-association.com.

Fez was the capital of Morocco for altogether more than 400 years, home of the oldest

university in the country, and the leading cultural and religious centre. Fez is also the home of the oldest and largest medieval city in the world, a city that remained almost unchanged through to the modern age, and it is still most definitely alive. Fez was founded in 789 at a spot between the mountains where the river was flowing by. History has provided the city with long periods of hardship, but Fez has never died. Today it has its own culture, pride, art and even cuisine.



Bab Boujeloud - Fez City

AIGAM & GMTR Representation at ANS Meetings
Professor Oum Keltoum attended the following meetings:

ANS Winter Meeting 2010 and Nuclear Technology Expo

The meeting was held November 7-11, 2010, in Las Vegas, in conjunction with three embedded conferences: TOFE, NPIC& HMIT2010, and IMI. The sessions organized focused on the challenges associated with the nuclear renaissance as a number of countries have launched a nuclear power program, and on key issues in successfully their nuclear power program. More than 150 plenary and technical sessions were scheduled, providing objective information, forums, and perspectives in the context of the global nuclear renaissance. Specific offerings, such as the Panels « *Training , Human Performance, and Workforce Development* », « *Nuclear Energy Growth in Emerging Countries* », and « *Focus on Communication – Pro-Nuclear Advocacy* » addressed major issues such as nuclear education and training around the world, and the availability and opportunities for the sharing of relevant infrastructure development in the nuclear area.

The Nuclear Technology Expo

This big event was held in conjunction with the ANS Winter Meeting. Its main objective was to bring together international experts of the nuclear industry involved in the operation, development, building, regulation and research related to Nuclear Power Plants. Design, deployment and construction of plants, and research and development of future designs and advanced systems were highlighted at this exhibit.

International Committee Meeting

The participation of [Prof. O.K. Bouhelal](#) at the ANS International Committee meeting allowed her to review, through two oral presentations by IC/ANS country members, their nuclear power programme current state and the strategies carried out to meet their specific needs. Relevant discussions with the IC/ANS members and managers examined the opportunity to better contribute to the ANS activities, by setting common scientific exchanges which may help knowledge transfer and experience sharing, and be useful for capacity building.

International Conference PHYSOR 2010, “Advances in Reactors Physics to Power the Nuclear Renaissance”

PHYSOR 2010 was held in Pittsburgh June 9-14, 2010. [Prof. O.K. Bouhelal](#) contributed on the Panel “Nuclear Engineering Education and Training Needs”, sponsored by the ANS Education and Training Division. [Prof. Bouhelal’s](#) presentation, “Enhancing Nuclear Knowledge for New Infrastructure Development in Morocco”, gave the opportunity to make a significant contribution to the discussions on the perspectives of enhancing nuclear knowledge and promoting cooperation between the communities represented.

- [OECD Nuclear Energy Agency \(http://www.nea.fr\)](http://www.nea.fr)

(Gleaned from the OECD NEA’s Monthly News Bulletins)

NEA Mission to Canada

23-24 February 2011 – [NEA Director-General Luis Echávarri](#) met with officials in Ottawa, Canada to discuss recent developments in nuclear energy from both the Canadian and international perspectives. Topics of discussion included the security of supply of medical radionuclides and the restructuring of [Atomic Energy of Canada Limited \(AECL\)](#), the Canadian crown corporation responsible for the advancement and support of [Canada Deuterium Uranium \(CANDU\)](#) reactor technology. [Mr. Echávarri](#) met with senior officials from Natural Resources Canada including [Deputy Minister Serge Dupont, Cécile Cléroux, Assistant Deputy Minister](#) in charge of AECL Restructuring, and [Sylvana Guindon, Director of the Nuclear Energy Division](#). [Mr. Echávarri](#) also met with [Dr. Michael Binder, President and Chief Executive Officer](#) of the [Canadian Nuclear Safety Commission \(CNSC\)](#) and [Hugh MacDiarmid, Chief Executive Officer of AECL](#). On 24 February, [Mr. Echávarri](#) was invited by the [Canadian Nuclear Association \(CNA\)](#) to present the [Nuclear Energy Technology Roadmap](#) to 2050 during the 2011 CNA Nuclear Industry Conference and Trade Show in Ottawa.



The NEA and Nuclear Energy in Turkey

8-9 February 2011 – At the invitation of the [Turkish Ministry of Energy and Natural Resources](#), [NEA Director-General Luis Echávarri](#) led an NEA delegation to Turkey to participate in meetings and a public conference on the introduction of nuclear power in the Turkish energy mix. A series of meetings with Turkish authorities was held at the Ministry of Foreign Affairs (MFA) in Ankara on 8 February in the presence of [Ambassador Mehmet Kucuk, Deputy Undersecretary of the MFA](#). On 9 February, [H.E. Taner Yildiz, Minister of Energy and Natural Resources](#) and [Mr. Luis](#)

[Echávarri](#) held a bilateral meeting prior to the public conference which was hosted at the [Turkish Atomic Energy Authority](#) in Ankara. The conference was attended by approximately 160 high-level managers and directors and was well covered by the Turkish media. This NEA mission was a unique opportunity to discuss Turkey's current energy situation from an international perspective and to explore the implementation of its first nuclear energy programme.

The International Nuclear and Radiological Event Scale (INES): 20 years of nuclear communication

On 2010 October 14, the International Atomic Energy Agency (IAEA) and the OECD Nuclear Energy Agency (NEA) celebrated the 20th anniversary of the International Nuclear and Radiological Event Scale (INES).

Jointly developed by the IAEA and the NEA in 1990, in the aftermath of the Chernobyl accident, the purpose of INES is to help nuclear and radiation safety authorities and the nuclear industry worldwide to rate nuclear and radiological events and to communicate their safety significance to the general public, the media and the technical community.

INES has often been compared to other scales used to measure physical properties such as temperature – the Celsius, Kelvin or Fahrenheit scales - or rate events such as earthquakes - the Richter scale. Like these scales, INES also has a sound technical background and can be easily understood.

INES was initially used to classify events at nuclear power plants only. It was subsequently extended to rate events occurring in any nuclear facility and during the transport of radioactive material, thus also covering events related to the overexposure of workers. Since 2008, INES has been extended to any event associated with the transport, storage and use of radioactive material and radiation sources, from those occurring at nuclear facilities to those associated with industrial use.

More generally, INES has also become a crucial nuclear communications tool. Since its inception, it has been adopted in 69 countries, and an increasing number of countries have expressed their interest in using INES and have designated INES national officers. Over the years, national nuclear safety authorities have made growing use of INES, while the public and the media have become more familiar with the scale and its significance. This is where the true success of INES stands, having helped to foster transparency and to provide a better understanding of nuclear-related events and activities.

A full description of the International Nuclear and Radiological Event Scale (INES) and its ratings may be found at www.iaea.org/Publications/Factsheets/English/ines.pdf.

Slovenia joins the OECD Nuclear Energy Agency

On 11 May 2011, the Republic of Slovenia became the 30th member country of the OECD Nuclear Energy Agency (NEA).

“We are very pleased to welcome Slovenia to the Agency,” said [NEA Director-General Luis Echávarri](#). “Through its full membership, Slovenia will build on its past

collaboration with the NEA to further contribute to the top international scientific, technological and legal expertise required for the safe, environmentally friendly and economical use of nuclear energy for peaceful purposes.”

“On behalf of Slovenia and the Slovenian Nuclear Safety Administration (SNSA), I can say that becoming a full member of the NEA is a very important step that will provide new challenges and mutual benefits for both our nation and for other member countries of the NEA,” said [**SNSA Director Dr. Andrej Stritar**](#).

An active member of the international nuclear community since its independence in 1991, Slovenia is party to the main treaties and agreements on the non-proliferation of nuclear weapons and on co-operation with regard to the peaceful uses of nuclear energy. It has been a party to the Paris Convention on Third Party Liability in the Field of Nuclear Energy since 2001 and the Brussels Supplementary Convention since 2003. Slovenia has been an observer in the seven NEA standing technical committees since 2002 and joined the Organisation for Economic Co-operation and Development (OECD) in July 2010.

Slovenia operates the Krško nuclear power plant, a one-unit 696 MWe pressurised water reactor (PWR) connected to the grid in 1981 and co-owned with Croatia. The reactor supplies 25% of the country’s electricity demand (currently, the electricity mix in Slovenia is 41% coal and gas, 29% hydro, 25% nuclear and 5% renewables). Slovenia also operates a nuclear training centre and a research reactor at the Jožef Stefan Institute, which has a staff of about 880 people.

- [**Romania**](#)

[**Mihaela Stiopol, President of AREN**](#) (the Romanian Nuclear Energy Association) and [**Constantin Milu, President of RSRP**](#) (Romanian Society for Radiological Protection) are very happy to send an invitation to the upcoming International Symposium on Nuclear Energy.

AREN and RSRP, together with the Romanian Atomic Forum (ROMATOM), have the pleasure to invite you to the tenth edition of the International Symposium on Nuclear Energy (SIEN 2011), which will be held in the Ramada Park Hotel in Bucharest, 16-20 October 2011. The theme of the Symposium will be “Nuclear Power - Today's Challenge”. The 2011 edition will be a blend of plenary talks given by outstanding personalities in the nuclear-power field and contributions of senior and young specialists. We expect significant developments in our field in the next years, and in this view, we consider the International Symposium on Nuclear Energy (SIEN 2011) to provide a unique opportunity to review the progress made and to look as far as possible into our future.

All information will be posted soon on the SIEN 2011 website (www.sien.ro). Please be sure that we are already looking forward to welcoming you in Bucharest.

- [Spain \(www.sne.es\)](http://www.sne.es)



Prof. Diana Cuervo, of the Sociedad Nuclear Española, sends SNE news:

The **36th Annual Meeting of the Spanish Nuclear Society**, held in Santiago de Compostela, was again a success. The number of delegates was over 560, with over 100 accompanying persons, making a total attendance of about 700 people. The program had 29 technical sessions, in which 266 papers were presented, divided into 28 oral sessions and 1 poster session. The meeting received support from about 30 corporate sponsors and 34 exhibitors. In addition, specific sessions were held on such interesting topics as “Science and Technology Development at CERN”, “New Developments in Inspection and Materials Technology”, and “European Initiatives on Nuclear Energy”.

Courses were conducted aimed at the exchange of information on topics such as “Liberalization of Gas and Electricity in Spain”, “Experiences and Impressions of the Nuclear Youth Members at Chernobyl”, and “Management of Design Modifications in a Nuclear Power Plant”.

Nuclear Youth Generation once again organized the “Basic Course in Nuclear Science and Technology”, which this year had the collaboration of EPRI (Electric Power Research Institute) and the institutional support of the University of Santiago de Compostela (USC). Women in Nuclear (WiN) organized a conference on “Energy Savings and Efficiency”, showing the increasing need to optimize our energy consumption, taking into account that energy is a finite commodity which we cannot afford to waste.

The main idea of the meeting was the future of energy in Spain and in the world. It can be seen how the developed countries and emerging economies are making decisions regarding medium-to-long-term energy planning. This included the role of nuclear energy as part of the energy mix, thus prolonging the operation of existing plants and postponing the building of new ones. The point of view of SNE is that Spain cannot be an exception to this reality.

This year the meeting had three plenary sessions. The first session was devoted to “Nuclear Energy Advertising in Spain and the World”, followed by “Ibero-American Nuclear Program”, and finally the third plenary session was devoted to the relationship between “Energy and the Electric Vehicle”.

In addition to plenary sessions there was a broad program of technical sessions where special importance was given to research and development aimed to the continuous improvement of the operation and maintenance of our plants, as well as the participation of Spanish industry in the new international projects.

The **37th Annual Meeting** will be held from 2011 September 28-30 in the city of Burgos, coinciding with the 40th anniversary of the Santa María de Garoña NPP. All the relevant information about the meeting is available at: www.reunionanualsne.es.



The SNE organized for one more year the winter session “**Nuclear Power Plants in 2010. Experiences and Perspectives**”, in which the Spanish nuclear industry representatives discussed issues relevant to nuclear power-plant operation in the past year (2010) and the future situation of the nuclear industry. The meeting also had the presence and participation of university representatives, teachers and students.

This year, the Special Session was devoted to “Economic Crisis and Energy Model” and was moderated by Lola Morales, in her last act as Vice President of the Spanish Nuclear Society.

The guest speakers for this special session were [Pedro Rivero, former UNESA President](#), and [José Claudio Aranzadi, former Minister of Industry and Energy](#). Their basic messages were that Spain is the European country with the most expensive industrial electricity tariff, followed only by Slovakia, Italy and Cyprus. The cheapest are those with the highest percentages of nuclear production: France and Finland. The United Kingdom is at an intermediate level.

Following the end of this session the **SNE Ordinary General Assembly** was held, where the positions of [President and Vice President](#) were taken over by [Lola Morales and Diego Molina](#), respectively.

The **new website** of the [Spanish Nuclear Society](#), www.sne.es, is now operational. This follows the previously mentioned institutional renewal of the logo and Annual Meeting web site, www.reunionanualsne.es.

The Spanish parliament has approved an amendment to the Sustainable Economy Act, allowing the **extension of plant life beyond 40 years** if the owners request, taking into account the decisions of the Nuclear Safety Council (CSN) and the evolution of demand and technology. This amendment will not affect the earlier decision to close the Garoña NPP in 2013.


- [Taiwan](#)

[Dr. Jec-Kong Gone, Chief, Nuclear Safety Supervisory Section](#), Department of Nuclear Regulation, Atomic Energy Council, and contact person for the ANS Taiwan Section, sent the following communication.

The local section had a board meeting in September and [Deputy Minister of Atomic Energy Council Dr. Der-Jhy Shieh](#) has been elected as the new President of the ANS Taiwan Section. [Dr. Shieh](#) will lead the Taiwan Section until September of 2011.

- [Turkey](#)


We reproduce here a presentation titled “Nuclear Energy Outlook in Turkey”, given at the 2010 November ANS meeting in Las Vegas, NV. The presentation was made by [Professor Kenan Ünlü](#) of the Pennsylvania State University, in the context of the session “Nuclear Energy Growth in Emerging Markets”, chaired by [Past ANS President Ted Quinn](#).



Nuclear Energy Outlook in TURKEY

Kenan Ünlü
Director, Radiation Science and Engineering Center,
Professor of Nuclear Engineering,
Pennsylvania State University, University Park, PA 16802

American Nuclear Society
2010 Winter Meeting
Nuclear Energy Growth in Emerging Markets
November 10, 2010
Las Vegas, Nevada




Turkey: Location & History


Turkey is located in Asia Minor (Anatolia) and Europe. Turkey is a bridge between the East and the West geographically and culturally. Republic of Turkey was founded in 1923. Modern Turkey is descendants of The Ottoman Empire (1299-1923).





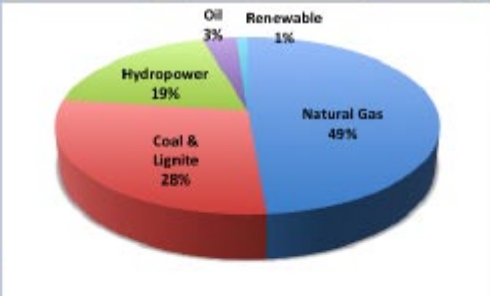

Turkey: Facts

- ♦ **Population:** 72.5 Millions (2009 census)
- ♦ **Area:** 783,562 km²
- ♦ **Government:** Parliamentary Representative Democracy
- ♦ **GDP per capita:** \$12,500
- ♦ **Economy:** 17th largest economy in the world
- ♦ **Economic Growth:** 6 % (strongest economic growth of OECD countries in 2010)

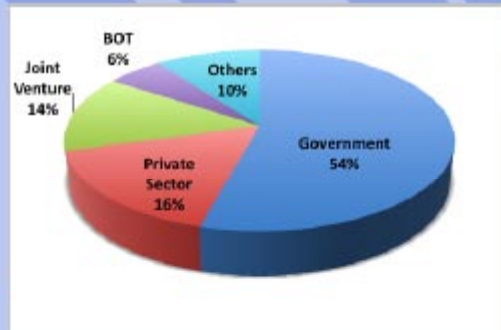
Turkey: Electricity Generation

Total electricity generation: **198.4 TWh (2009)**
Electricity generation sources in 2009:

Turkey: Electricity Generation

Installed Capacity: **46,126 MW** (July 2010)



Turkey: Energy Bridge



Energy Bridge between major oil and gas producing areas (Middle East, Caspian Sea, Central Asia, and Russia) to Europe and the World.

Turkey: Oil and Natural Gas Pipelines

Oil Pipelines:

- Kirkuk - Ceyhan (1,6 MB/day)
- Baku - Tbilisi - Ceyhan (1,0 MB/day)
- Samsun - Ceyhan (1,5 MB/day) planned

Natural Gas Pipelines:

- Blue Stream (Trans Black Sea) (16 Bm³/year)
- Tabriz - Ankara (14 Bm³/year)
- South Caucasus (8,8 Bm³/year)
- Nabucco (Turkey - Austria) (31 Bm³/year) planned
- Turkey - Greece (7 Bm³/year)
- Arab Gas (10 Bm³/year) planned

Turkey: Electricity Consumption/Production Projections for 2020

Projected Electricity Consumption Increase	Projected Total Electricity Generation	Projected Install Capacity	New Install Capacity Needed by 2020
8.0 %	499 TWh	114,000 MW	68,000 MW
6.1 %	406 TWh	93,000 MW	47,000 MW

Needed ~ 5,000 to 6,000 MW new installations per year next 10 years (Source: Turkish Energy and Natural Resources Ministry)

Nuclear Energy in Turkey: a History

- 1956 -- Turkish Atomic Energy Commission (TAEK) established
- 1959-1962 -- 1 MW Research Reactor (TR-1) (shut down later)
- 1962 -- Cekmece Nuclear Research and Training Center (CNAEM) and Ankara Nuclear Research and Training Center (ANAEM) established
- 1979 -- 250 kW TRIGA Mark II at Istanbul Technical University
- 1984 -- 5 MW (TR-2) at CNAEM (HEU to LEU conversion 2009)
- 1961 -- Istanbul Technical University (Graduate)
- 1977-1982 -- Hacettepe University (Undergraduate and Graduate)

Nuclear Energy in Turkey: a History

First Attempt: 1960's

- Electric Survey Institute and Istanbul Technical University Nuclear Energy Institute initiated a Nuclear Power Plant Project in 1965 and planned to have a 300-400 MWe PHWR in 1977. The Project never materialized.

Second Attempt: 1970's

- Turkish Electric Authority started site selection for a NPP. Akkuyu region at Mediterranean selected in 1976. Negotiation for 600 MWe NPP started with ASEA-Atom and Stal Laval consortium. Project cancelled in 1980.

Nuclear Energy in Turkey: a History

◆ Third Attempt: 1980's

- ◆ Major NPP suppliers invited for an open bid in 1983. Three LOI issued to:
 - ◆ AECL (Akkuyu Site)
 - ◆ KWU (Akkuyu Site)
 - ◆ GE (Sinop- Black Sea Site)
- ◆ Negotiation with GE suspended because Sinop site was not ready. Negotiation continued with AECL and KWU. Build-Operate-Transfer (BOT) model adopted by Turkish Government. KWU declined to participate BOT model. Preliminary agreement was signed with AECL in 1985. Project cancelled because of disagreement with the Joint Utility Venture partnership terms in 1986.



Nuclear Energy in Turkey: a History

◆ Fourth Attempt: 1990's

- ◆ Major NPP suppliers invited for an open bid in 1994 for two 1,000 MW NPP. Eighteen bids were received. Three consortium are selected for negotiations:
 - ◆ Westinghouse-Mitsubishi
 - ◆ AECL
 - ◆ NPI
- ◆ Build-Operate-Transfer (BOT) model or other creative financial approaches considered. After intense negotiations project was cancelled in 2000.



Nuclear Energy in Turkey: a History

◆ Fifth Attempt: 2000's

- ◆ Major NPP suppliers invited for an open bid in 2008 for four units (5,000 MW) NPP. Only one bid was received:
 - ◆ AtomStroyExport, Inter Rao (Russian Federation) and Park Teknik (Turkish) Consortium
- ◆ Bid process was cancelled and direct negotiations started between Turkey (Energy and Natural Resources Ministry) and Russia (Rosatom). Turkish and Russian Federation Government signed an agreement to build four VVER 1200/491 (AES 2006) at Akkuyu sites on May 12, 2010.



Turkey - Russian Federation



- ◆ Turkey and Russia have issued joint declaration for nuclear energy cooperation in Feb 2009 (President Gül-PM Putin)
- ◆ Turkey and Russia signed agreement to build four VVER-1200 (AES 2006) in May 2010 (President Gül - President Medvedev)




Turkish NPP Sites



VVER-1200/491 (AES-2006)


- ◆ VVER-1200 is an evolution of VVER-1000
- ◆ VVER-1000 was developed 1975-1985
- ◆ Several generations of VVER-1000 developed
 - ◆ VVER-1000 (V338, 320, 392,...)
 - ◆ VVER 91
 - ◆ VVER 92
 - ◆ AES 91 (VVER-1000/V-412) – India
 - ◆ AES 92 (VVER-1000/V-428) – China
 - ◆ AES 92 (VVER-1000/466) –Iran
 - ◆ VVER-1200/392 (AES-2006) – Russia (Novovoronezh II, under construction)
 - ◆ VVER-1200/491 (AES-2006) – Russia (Leningrad II, under construction)





VVER-1200/491 (AES-2006) Specifications

- ◆ Design lifetime of reactor vessel up to 60 years
- ◆ Nominal thermal capacity 3200 MWt
- ◆ Planned construction time 54 months
- ◆ Safety Features:
 - ◆ Containment Building and Missile Shield
 - ◆ Full Emergency Systems: emergency core cooling, diesel backup power supply, advanced refueling machine, computerized reactor control systems, backup feedwater supply, reactor SCRAM system
- ◆ Single building for reactor, refueling machine, diesel backup power supply, steam generators and reactor control systems
- ◆ Another building for turbogenerators




Turkey (Energy and Natural Resources Ministry) - Russian Federation (Rosatom) Agreement Build-Own-Operate (BOO)

- ◆ Russia form a Nuclear Project Company (NPC) in Turkey
 - ◆ Turkish companies could participate, Russian share minimum 51%
- ◆ Russia Build four units of VVER-1200/491 (AES-2006)
 - ◆ Unit 1 completed in 7 years, Unit 2 one year after Unit 1, Unit 3 one year after Unit 2, and Unit 4 one year after Unit 3
- ◆ Turkey will buy 70 % electricity generated from Unit 1 and Unit 2 for 15 years of operation
- ◆ Turkey will buy 30 % electricity generated from Unit 3 and Unit 4 for 15 years of operation
- ◆ NPC will sell remaining 30 % from Unit 1 and 2 and 70 % from Unit 3 and 4 on free market




Turkey (Energy and Natural Resources Ministry) - Russian Federation (Rosatom) Agreement Build-Own-Operate (BOO)

- ◆ After 15 years of operation for each unit NPC gives 20 % of net profit to Turkey
- ◆ Turkey allocate the site and existing infrastructure free of charge to NPC until decommissioning
- ◆ NPC provides fuel from suppliers
- ◆ Spent fuel from Russian origin may be reprocessed in Russia
- ◆ NPC is responsible for decommissioning and waste management




Nuclear Energy Outlook in Turkey

- ◆ Fifth time is a charm !!
- ◆ Turkish parliament ratified the agreement in July 15, 2010.
- ◆ PM Putin signed the Turkish-Russian NPP agreement on September 24, 2010. Ratification by Duma is expected soon.
- ◆ Construction of Unit 1 expected to start in 2011
- ◆ Completion of Unit 1 expected in 2018
- ◆ Completion of entire project expected by 2021

- ◆ Negotiations continue with Korea (KEPCO) and Japan (Toshiba) to build another four units (5,000 MW) NPP at Sinop site.



- [USA](#)

Third Annual MeV Summer School

On July 19-28, 2011, the third annual MeV Summer School will be held at the Advanced Photon Source (APS) Facility in Argonne National Laboratory. The school is once again co-sponsored by the Idaho National Laboratory (INL), Idaho State University (ISU), and Argonne National Laboratory (ANL). This year, the Center for Advanced Energy Studies (CAES) and Oak Ridge National Laboratory (ORNL) are also co-sponsors.

The objective of the school is to provide early-career nuclear engineers with advanced studies in integrated modeling, experimentation, and validation to prepare them for some of the key challenges and demands facing the nuclear energy renaissance.

The 2011 focus is Reactor Physics Computations, Validation and Integration in Multiphysics Codes and includes the following major topics:

Reactor physics modeling and analysis methods; Nuclear data theory, measurements, and evaluation; Multiphysics (thermal hydraulics, neutronics, materials, fuels, I&C) of plant dynamics in operational, abnormal transients and accidents; Basics and advances in nuclear energy systems modeling and simulation that encompasses critical review of equations and numerical methods; Experimental measurements of reactor physics behavior; Sensitivity analysis, uncertainty quantification and data assimilation methods; and Advanced verification and validation methods.

Up-to-date information about the events can be found at <http://www.mevschool.org/>.

ANS President Joe Colvin sends congratulations to the Santa de Garoña nuclear power plant on the occasion of its 40th anniversary of operation on 2011 March 2.

“On behalf of the 11,000 plus members of the American Nuclear Society, we extend our warm and sincere congratulations to the management and staff of the Santa Maria de Garoña nuclear power plant for its tremendous accomplishment of safe, clean and efficient nuclear plant operations over its 40 years of operation.

The American Nuclear Society is responsible for promoting the advancement of nuclear science and technology, and the accomplishments and efforts of the Santa Maria de Garoña team stand as an excellent example for all other nuclear companies and plants to emulate. This is particularly important as the world is moving forward with the nuclear renaissance and many countries are just beginning their voyage into nuclear. The experiences of your team over these 40 years of operation will benefit those countries and shorten their learning to achieve similar positive results in the future.

We look forward to an expanded future for Santa Maria de Garoña as it continues in operation to provide safe, environmentally clean and efficient electricity to the consumers in your area.

Our warmest regards and congratulations to Nuclenor and the team at Santa Maria de Garoña!”

Dr. Patricia Paviet-Hartmann of the Nuclear Science & Technology Directorate at the Idaho National Laboratory sends the following announcements.

“2nd INEST Fuel Cycle Summer Workshop - Defining a National User Facility Concept for Enhancing the University, Laboratory, Industry Base for US Advanced Fuel Cycle Research, Development, and Demonstration”, 2011 August 9-10, Seattle, WA

The U.S. does not have an effective coupling for advanced nuclear fuel cycle R&D between universities, laboratories, and industry. Nuclear fuel-cycle R&D is required to address critical issues in closed fuel-cycle separations, radioactive waste management, and nonproliferation. These limitations limit effective transfer of new technologies from universities to laboratories and industry and provide barriers for universities to supply the research talent needed by the federal government and industry. This is a consequence of (1) the high cost of specialized research facilities (gloveboxes and hot cells) that has limited university R&D, (2) the legacy of the cold war that resulted in large but now aging facilities at national laboratories, (3) the transformation of how research is conducted. The workshop is to explore methods to improve this coupling including the development of an Advanced Fuel Cycle User Facility to provide the specialized facilities in this area. Such facilities have been developed by the National Science Foundation and the DOE Office of Science to help bridge this gap in other fields. Other parts of the world have developed similar structures, such as the European Union ITU facility used by universities, industry, and others. For more information, please contact **Patricia Paviet-Hartmann** (patricia.paviet-hartmann@inl.gov).

ACS Fall Meeting, 2011 August 28 – September 1, Denver, CO

This symposium is being organized as part of the 2011 International Year of Chemistry to honor the achievements of Marie Curie and to highlight the current work of women chemists from all over the world. We would appreciate if you could join us in celebrating the legacy of Marie Curie. For more information, please contact **Marsha Lambregts** (marsha.lambregts@inl.gov).

2011 U.S.-China Strategic Forum on Clean Energy Cooperation - An Overview

The 2011 U.S.-China Strategic Forum on Clean Energy Cooperation was convened on January 18-19 in Washington, DC, by the Brookings Institution and the China Institute for Innovation and Development Strategy. This marked the second year of the Forum. Like the inaugural event convened in October 2009 in Beijing, participants in this year's Forum included top officials in the U.S. government, corporate sector, scientific community, and public policy think tanks, along with a comparable array of Chinese participants.

The 2011 Forum had keynote speeches and panel presentations by American figures such as **U.S. Energy Secretary Steven Chu**, **U.S. Ambassador to China Jon M. Huntsman Jr.**, and *Presidential Science and Technology Advisor John Holdren*. From the Chinese side, figures such as **National Energy Administration head Zhang Guobao** and **Minister of Science and Technology Wan Gang** also gave speeches at the event. With more than 200 distinguished guests and participants from both sides, the 2011 Forum was able to lead consequential discussions among those who are devoted to advancing both clean-energy development and broader strategic relations between the two countries.

In addition to a full complement of high-level keynote speeches, the 2011 Forum also

hosted working-group sessions that formed the core of the event. The working-group sessions focused respectively on cooperation regarding clean coal, nuclear power and renewable energy. Two additional round-table discussions were also held to address the prospects for overall U.S.-China relations during the coming decade and the potential for Chinese investment in US clean energy infrastructure. These closed-door sessions encouraged candid exchanges between the two sides to maximize progress on practical U.S.-China cooperation in clean energy.

The focus of the working groups evolves from year to year. Both sides, however, also seek to maintain sufficient continuity from Forum to Forum to build personal ties, enhance knowledge of opportunities, and sustain the analytical discussions beyond the closing date of each Forum. In addition, each Forum is supported by research papers done by each delegation.

- [World Nuclear University \(WNU\)](#)

The World Nuclear University is busy organizing its 7th Annual WNU Summer Institute, which will be held From July 9 to August 20 at Christ Church, University of Oxford, UK.

The Summer Institute is a unique career-development program for future world leaders in nuclear science and technology. Each WNU Summer Institute is attended by around 100 young Fellows from around the world, selected from promising nuclear professionals who have demonstrated strong leadership potential. The average age of Fellows over the years has been around 30, and the course is aimed at nuclear professionals between 27 and 37. More information is available at:

<http://www.world-nuclear-university.org/about.aspx?id=17688>.

News from ANS Divisions

To further the implementation of the Joint Protocol between the IC and the Professional Divisions Committee, we are pleased to include in the Globe some newsworthy Division items. While some items can be gleaned from the Divisions' web pages, please send us your most up-to-date and timely news to post in the *ANS Globe*!

- [Environmental Sciences Division \(ESD\)](http://www.esd-ans.org/cms/) (<http://www.esd-ans.org/cms/>)

The Environmental Sciences Division of the ANS has selected [Dr. Theodore Rockwell](#) as its recipient of the 2011 W. Bennett Lewis Award for Sustainable Energy and Development.

The W. Bennett Lewis Award is a national ANS award which is administered by ESD and which serves to recognize persons who during a life-long career have made major contributions towards solving humanity's need for sustainable solutions in energy and development. Among the previous recipients are: [Wolf Haefely](#) (Germany), [Bernard Cohen](#), [Pete Domenici](#), [Georges Vendryes](#) (France).

The award presentation is planned to take place during the ANS Winter Meeting in Washington, DC, in November 2011.

- [Reactor Physics Division \(RPD\)](#) (<http://rpd.ans.org>)

The next “Physics of Reactors Topical Meeting”, PHYSOR 2012 will be held in downtown Knoxville, Tennessee, April 15-20, 2012. Key supporting organizations are ORNL/UT-Battelle, UTK, TVA, EPRI, and Y12/B&W.

The Honorary Chairs of PHYSOR-12 will be [Lee Dodds \(UTK\)](#), [Kord Smith \(Studsvik Scandpower\)](#), and [Paul Turinsky \(NCSU\)](#).

The theme that was selected for PHYSOR 2012 is “Advances in Reactor Physics – Linking Research, Industry, and Education.” This theme will guide a structure for the meeting to emphasize these particular areas. The website is www.physor2012.org.

- [Thermal Hydraulics Division \(THD\)](#) (<http://thd.ans.org>)



The 14th International Topical Meeting on Nuclear Reactor Thermal Hydraulics (NURETH-14) will be held in Toronto, Ontario, Canada, from September 25 to 30, 2011, and is organized in cooperation with the Canadian Nuclear Society, along with many co-sponsoring organizations from the international nuclear community. The theme of NURETH-14 is “Helping the Environment with Advances in Thermal Hydraulics”. The Conference website URL is <http://cns-snc.ca/events/nureth-14/>. As of this writing, paper reviews are on-going, and an exciting program is quickly coming together.

Highlights from the 2010 Nov Meeting in Las Vegas, NV

International Committee Vice-Chair Atam Rao introduced Dr. Adriaan Buijs, Professor of Nuclear Engineering at McMaster University, Hamilton, Ontario, Canada, and President of the Canadian Nuclear Society. Dr. Buijs made a presentation entitled “The Canadian Nuclear Landscape: An Update”, which is reproduced below.



The Canadian Nuclear Landscape: An Update

Adriaan Buijs,
President of the Canadian Nuclear Society

ANS International Committee Meeting,
November 7th, 2010, Las Vegas



Content

- Introduction
- Canadian Reactors
- Reactors in Canada
- Life Span Extension
- Waste and Spent Fuel Management
- Public Support and Policy
- Future Developments
- CNS

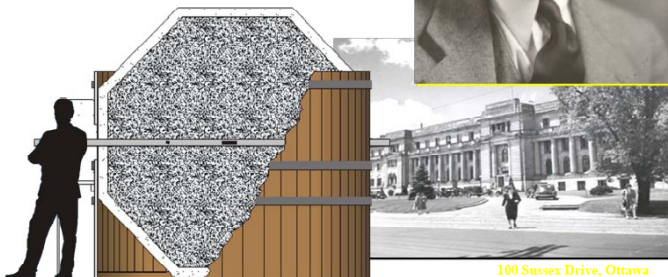


1941-42 ...

George Laurence

(1905 - 1987)

World's first large-scale fission
experiments in graphite
(National Research Council)



100 Sussex Drive, Ottawa



Introduction

- Canada's contribution to the Manhattan project: breed Pu with heavy-water moderated natural U reactor: ZEEP. (not applied)
- ZED-2:
 - Successor of ZEEP
 - Celebrated 50 years of operation 2009
 - Received ANS nuclear historical landmark.
 - Used for code validation for CANDU fuel

ZED-2 ca. 1964



Introduction

- After the war, decide to proceed with civilian program on the same basis:
- Birth of **Canada Deuterium Uranium** reactor (CANDU)

ZED-2 ca. 1964



Introduction

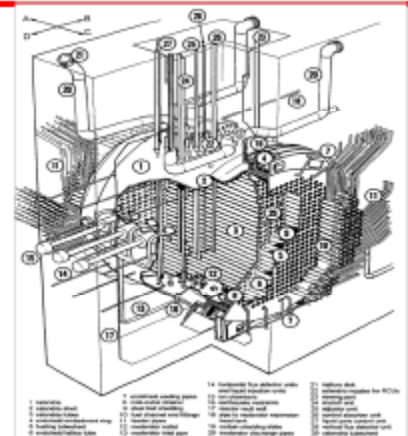
- After the war, decide to proceed with civilian program on the same basis:
- Birth of **Canada Deuterium Uranium** reactor (CANDU)

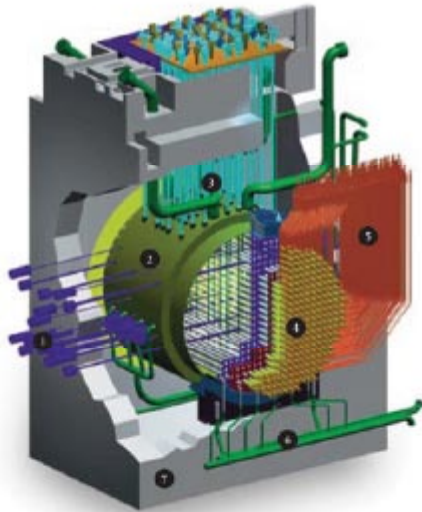
Canadian Reactors

- Heavy-water moderated and cooled
- Natural uranium fuel
- Horizontal fuel-channel design
- On-power refuelling

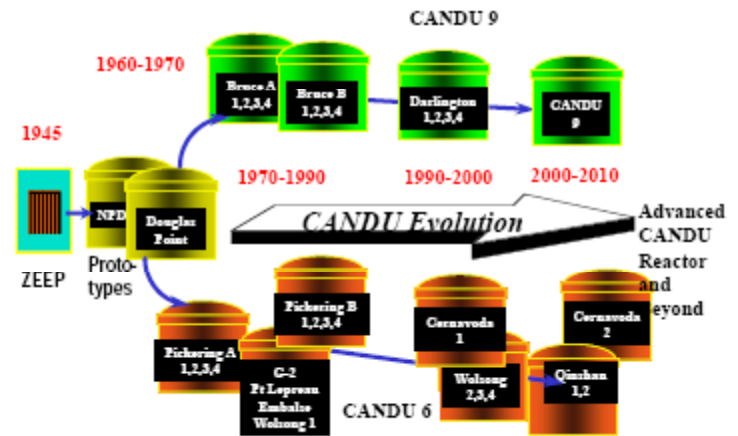
- High uranium utilization
- Flexible fuel cycle

CANDU-6





CANDU Development Builds on a Strong History



WORLD CLASS TECHNOLOGY

48 heavy water reactors based on the CANDU design in operation, under construction, or under refurbishment – located on four continents.



AECL OFFICES		CANDU REACTORS		REFURBISHMENTS	
1	Head Office, Mississauga, Canada	1	Ontario, Canada (18 units)	1	Ontario, Canada
2	Chalk River Laboratories, Canada	2	Quebec, Canada (1 unit)	2	New Brunswick, Canada
3	Whitehall Laboratories, Canada	3	New Brunswick, Canada (1 unit)	3	South Korea
4	Bruce County, Canada	4	Argentina (1 unit)		
5	Montreal, Canada	5	China (2 units)		
6	Ottawa, Canada	6	India (15 units, 3 under construction)		
7	Pickering, Canada	7	Pakistan (1 unit)		
8	Saint John, Canada	8	Romania (2 units)		
9	Buenos Aires, Argentina	9	South Korea (4 units)		
10	Beijing, China				
11	Shanghai, China				
12	Cernavoda, Romania				
13	Seoul, South Korea				
14	Gaithersburg, Maryland, U.S.A.				



Nuclear Power in Canada

➤ 20 CANDU Units:

- 18 in Ontario,
- 1 in Quebec,
- 1 in New Brunswick;
- Two Pickering reactors permanently mothballed.

➤ Provide 50% of the 'hydro' in Ontario, 15% in all Canada (12,000 MW).

➤ Last Darlington units operational in 1993



Life Span Extension Refurbishment

- Low-pressure moderator: safety-feature.
- Pressure tubes are the pressure boundary.
- Creep and sag under heat and neutron irradiation.
- Need to be replaced at mid-life.
- First project at Point Lepreau. Status:
 - AECL decided to replace all 380 calandria tubes due to initial problems with rolled joints.
- Other refurbishments at Bruce Power and Wolsong ongoing.

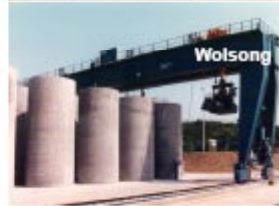
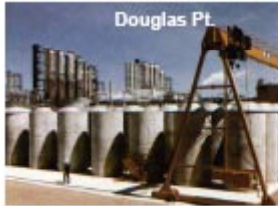


Spent Fuel Management

- All spent CANDU fuel stored on-site
 - Spent fuel bay;
 - Dry storage;
- Total of 5 hockey rinks filled to the boards.



AECL Dry Storage Applications



Low- and Intermediate-Level Nuclear Waste

- A Deep Geological Repository for low and intermediate level nuclear waste has been proposed near Kincardine (where Bruce reactors are)
- The DGR would be located 680 metres or 2230 feet below the surface, beneath very thick layers of limestone and shale rock.
- In 2005, the Municipality of Kincardine conducted a poll among its citizens to gauge the level of support for the DGR. The majority agreed with OPG's recommendation and the project has now entered the long and careful regulatory process. Pending approvals and licensing by regulatory agencies, the DGR will commence construction in 2012 and operation in 2017/2018.



Isotope Production

- For 50 years, bulk of world production of Mo-99 from NRU reactor at Chalk River
- To be replaced by Maple Reactors, construction completed in 2000.
- Due to licensing issues, project was abandoned in 2008.
- NRU developed leak in 2009; restart after repair in August 2010

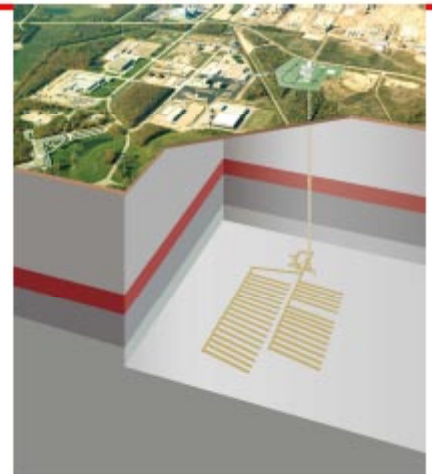


Nuclear Waste Management Organisation

- The Nuclear Waste Management Organization (NWMO) was established in 2002 in accordance with the *Nuclear Fuel Waste Act* to assume responsibility for long-term management of Canada's used nuclear fuel.
- Extensive program of public consultation with stakeholders.
- Study of storage option.
- Outcome: NWMO recommends Deep Geological Repository for used nuclear fuel.
- Next step: identify location, host community.



DGR



Isotope Production

- For 50 years, bulk of world production of Mo-99 from NRU reactor at Chalk River
- To be replaced by Maple Reactors, construction completed in 2000.
- Due to licensing issues, project was abandoned in 2008.
- NRU developed leak in 2009; restart after repair in August 2010



Public Support

- 50/50 (personal opinion)
- Strong, well organised antinuclear movements.
- Media not supportive
- Politicians hesitant
- Communities hosting nuclear facilities very supportive.
- Nuclear regulator under new management
- Canadian Nuclear Association under new management.



Nuclear developments

- Privatisation of CANDU business of AECL
- New management model for Chalk River
- New build at Darlington site
- Test of recovered uranium in Chinese CANDU at Qinshan.
- Development projects for use of thorium fuel.



R&D

- AECL's new reactor design ACR-1000:
 - Low enrichment 2.5%
 - Light-water cooling.
- Proposals for new research reactor. (CNS)
- Proposals for medical isotope production.
- GEN-IV research

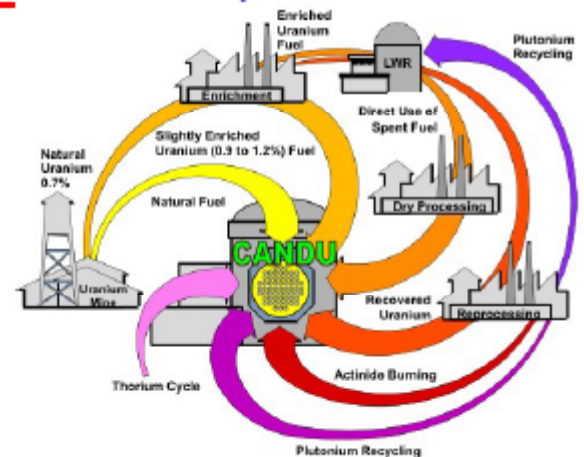


(Nuclear) Energy Policy

- Phase out coal-fired plants (2014?)
- Maintain nuclear at current level
 - Note: this requires new-build
- Increase share of renewables:
 - Subsidies
 - Feed-in tariffs
- Conservation



Nuclear Fuel Cycle with CANDU



Gen IV Involvement

- Canada participates in the gen IV project for Super-Critical Water Reactor (SCWR)
- Direct-cycle design;
- Research funding through NRCAN
- Collaborative efforts with China;
- Workshops organised by CNS.



CNS

- Technical Society (spin-off from CNA)
- Around 1200 paying members
- Divisions:
 - Nuclear Science & Engineering
 - Fuel Technologies
 - Design and Materials
 - Environment & Waste Mgmt
 - Nuclear Ops & Maintenance
 - Mining and Processing
 - Medical Applications and Radiation Protection
 - Fusion Science and Technology



CNS

- Committees:
 - Program
 - CNA Interface
 - WIN Interface
 - COG Interface
 - OCI Interface
 - Branch Affairs
 - Education and Communications
 - Membership
- Bulletin
- Finance
- Past Presidents'
- Honours and Awards
- International Liaison
- Internet
- Universities
- Inter-society Relations
- Young Generation
- Representative to PAGSE



Activities

- **Organising events:**
 - Conferences, courses, workshops of a *technical* nature.
 - Subject: topics related to nuclear
 - Target audience: anybody interested
 - An event may be organised by CNS for a restricted audience on behalf of a third party, or as suggested by a third party. E.g. safety course for Bruce Power; Small reactor workshop suggested by AECL.



Examples of Conferences

- CNS Annual Conference
- CNS Student Conference
- International Conference on CANDU Fuel
- Nuclear Plant Chemistry Conference
- Nuclear Education and Outreach Conference
- CANDU Maintenance Conference
- Waste Management Conference
- Steam Generator Conference
- Climate Change



Examples of Courses

- CANDU Reactor Safety
- CANDU Lattice-Physics
- Radionuclide production
- Small reactors
- Regional Overpower Protection (ROP) System
- Role of Reactor Physics in CANDU Power Plant Engineering
- Quality Assurance
- Science of Nuclear Energy and Radiation
- CANDU Design
- CANDU Aging
- MAPLE Technology
- Trip-Coverage



Sponsorships by CNS

- Other events (financial or non-financial)
- WNU bursary
- Summer students
- Graduate students
- Deep River Science Academy
- Science fairs (also sponsored by branches)
- Other science-related organisations
- Ad hoc occasions related to mandate of CNS.



Outreach (Education and Communication)

- High-school essay projects
- High-school lectures and demonstrations
- Speakers' Bureau (not yet implemented)
- Geiger-counter school curriculum project, incl. teacher training



Media

- Bulletin
- Journal
- Nuclear Yearbook
- Press releases when appropriate
- Website



Honours and Awards

- Number of industry-wide prizes and awards offered annually.
- Yearly event organised with CNA at CNS annual conference



Students

- Student conference at the annual conference
- Undergraduate scholarships
- Graduate scholarship
- Support see under sponsorship
- Student poster display at various CNS events

Societies with Collaboration Agreements with ANS

The following is a list of nuclear societies with collaboration agreements with the ANS, along with the corresponding website addresses. The Table contains also a few other entries of interest to ANS International Committee members.

Society	Website or E-Mail Address
Asociación Argentina de Tecnología Nuclear	www.aatn.org.ar
Associação Brasileira de Energia Nuclear	www.aben.com.br
Association des Ingénieurs en génie atomique du Maroc	-
Atomic Energy Society of Japan	wwwsoc.nii.ac.jp/aesj/index-e.html
Australian Nuclear Association	www.nuclearaustralia.org.au
Bangladesh Nuclear Society	-
Bulgarian Nuclear Society	www.bgns.bg
Canadian Nuclear Society	www.cns-snc.ca
Chinese Nuclear Society	www.ns.org.cn

Croatian Nuclear Society	www.nuklearno-drustvo.hr/en/home.html
Czech Nuclear Society	www.csvts.cz/cns
European Nuclear Society	www.euronuclear.org
Hungarian Nuclear Society	www.kfki.hu/~hnucsoc/hns.htm
Indian Nuclear Society	www.indian-nuclear-society.org.in
Israel Nuclear Society	meins@tx.technion.ac.il
Korean Nuclear Society	www.nuclear.or.kr/e_introduce.php
Lithuanian Energy Institute	www.lei.lt
Malaysian Nuclear Society	www.nuklearmalaysia.org/index.php?id=18mnu=1
Nuclear Energy Society of Kazakhstan	www.nuclear.kz
Nuclear Energy Society of Russia	ns@kiae.ru
Nuclear Energy Society of Slovenia	www.drustvo-js.si
Nuclear Energy Society of Thailand	www.nst.or.th
OECD/Nuclear Energy Agency	www.nea.fr
Polish Nuclear Society	www.ptn.nuclear.pl
Romanian Nuclear Energy Association	www.aren.ro
Romanian Society for Radiological Protection	www.srrp.ro
Slovak Nuclear Society	www.snus.sk
Sociedad Nuclear Española (SNE)	www.sne.es
Sociedad Nuclear Mexicana	www.sociedadnuclear.org.mx
Ukrainian Nuclear Society	www.ukrns.odessa.net
United Kingdom Nuclear Institute	www.nuclearinst.com/ibis/Nuclear%20Institute/Home
Women in Nuclear – Global	www.win-global.org
Affiliated National Societies	Website or E-Mail Address
Belgian Nuclear Society	www.bns-org.be
Associated Nuclear Organizations	Website or E-Mail Address
International Nuclear Societies Council	http://insc.ans.org
Pacific Nuclear Council	http://www.pacificnuclear.net/pnc/
Non-U.S. Local Sections	Website or E-Mail Address
Austrian Section	
French Section	http://local.ans.org/france/
India Section	http://local.ans.org/india/
Italian Section	
Japanese Section	
Latin American Section	www.las-ans.org.br
Korean Section	
Swiss Section	
Taiwan Section	u805301@taipower.com.tw

Calendar of Events

Some Upcoming International Conferences on Nuclear and Related Topics
(Please send us information about your upcoming conferences, for inclusion in this space.)

Legend:

☀ **ANS Event**

☐ **Non-ANS event co-sponsored by ANS**

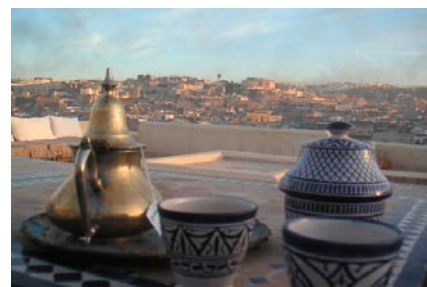
o **For all other conferences, ANS is NOT a sponsor, nor are these conferences endorsed by ANS.**

2011

- 12-15 June: 32nd Annual Conference of the Canadian Nuclear Society and 35th CNS/CNA Student Conference, Niagara Falls, Ontario, Canada – <http://www.cns-snc.ca>
- 19-24 June: ICRER 2011, McMaster University (Hamilton, Ontario), Canada – <http://www.ecorad2011.net>
- 26-30 June: ANS Annual Meeting, Hollywood, FL, USA – <http://www.ans.org/meetings> ☀
- 9 July – 20 August: The 7th Annual World Nuclear University Summer Institute, Christ Church, Oxford University, UK - <http://www.world-nuclear-university.org/about.aspx?id=17688>
- 19-28 July: Third Annual MeV Summer School, Advanced Photon Source Facility, Argonne National Laboratory – <http://www.mevschool.org/>
- 7-10 August: Third International Joint Topical Meeting on Emergency Preparedness and Response and Robotics and Remote Systems, Knoxville, TN, USA – <http://www.eprsd.org/> ☀
- 9-10 August: 2nd INEST Fuel Cycle Summer Workshop, Seattle, WA - Defining a National User Facility Concept for Enhancing the University, Laboratory, Industry Base for US Advanced Fuel Cycle Research, Development, and Demonstration. Contact Patricia Paviet-Hartmann (patricia.paviet-hartmann@inl.gov).
- 21-25 August: International Symposium on Future I&C for Nuclear Power Plants, Cognitive Systems Engineering Approach to Power Plant Control, International Symposium on Symbiotic Nuclear Power Systems (ICI 2011), Daejeon, Republic of Korea – <http://www.ici2011.org>



- 25 August – 2 September: Frédéric Joliot & Otto Hahn Summer School (FJOH-2011), focusing on High-Fidelity Modelling for Nuclear Reactors – Challenges Prospects, Karlsruhe, Germany – <http://www.fjohss.eu>
- 28 August – 1 September: ACS Fall Meeting, Denver, CO. Contact Marsha Lambregts (marsha.lambregts@inl.gov). Organized as part of the 2011 International Year of Chemistry to honor the achievements of Marie Curie and to highlight the current work of women chemists from all over the world. Please contact Marsha Lambregts (marsha.lambregts@inl.gov).
- 4-9 September: Global 2011, “Innovative Nuclear Energy Systems Toward 2030 and Beyond”, Nagoya, Japan – <http://wwwsoc.nii.ac.jp/aesj/division/recycle/global2011/> □
- 11-14 September: 2011 Water Reactor Fuel Performance Meeting, Chengdu, China, organized by Chinese Nuclear Society – <http://www.ns.org.cn/cn/WRFPM> □
- 11-15 September: Canadian Nuclear Society Conference on Waste Management, Decommissioning and Environmental Restoration for Canada’s Nuclear Activities 2011, Toronto, Ontario, Canada - <http://www.cns-snc.ca> □
- 12-15 September: Nuclear Society of Slovenia’s 20th International Conference “Nuclear Energy in New Europe”, Bovec, Slovenia (<http://www.nss.si/nene2011/>).
- 18-23 September: 3rd International Nuclear Chemistry Congress (3rd-INCC), Città del Mare, Palermo, Sicily, Italy – <http://3rdINCC.MI.INFN.IT>
- 19-22 September: International Conference on Criticality Safety, Edinburgh, Scotland
- 25-30 September: 14th International Topical Meeting on Nuclear Reactor Thermalhydraulics (NURETH-14), organized by the Canadian Nuclear Society, Toronto, Ontario, Canada – <http://www.cns-snc.ca/events/nureth-14/> □
- 26-28 September: International Conference on Physics and Technology of Reactors and Applications (PHYTRA2), Fez, Morocco – www.gmtr-association.com/phytra2/ □
- 29 September - 1 October: India Nuclear Energy 2011, Third International Exhibition and Conference, Mumbai, India - <http://www.indianuclearenergy.net/introduction.htm>
- 2-5 October: International Conference on the Future of Heavy-Water Reactors,



organized by the Canadian Nuclear Society, Ottawa, Ontario, Canada - <http://www.cns-snc.ca/events/cns-fhwr/>

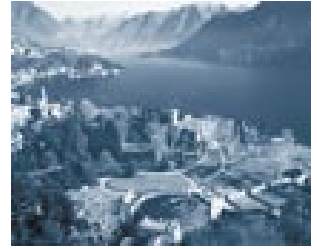
- 3-7 October: ISEC-2011 (International Conference on Solvent Extraction), Santiago, Chile - http://www.isec2011.com/evento2011/images/mailling/01/10ISEC_ing.html
- 11-14 October: 2011 Annual Conference of the Chinese Nuclear Society, Guiyang, China
- 16-20 October: 10th International Symposium on Nuclear Energy (SIEN-2011), Bucharest, Romania – <http://www.sien.ro>
- 30 October-3 November: ANS/ENS International Winter Meeting and Nuclear Technology Expo, Washington, DC, USA – <http://www.ans.org/meetings> ☀

2012

- 22-27 January: 10th International Conference on Nuclear Analytical Methods in the Life Science, Bangkok, Thailand □
- 25-30 March: 9th International Conference on the Methods and Applications of Radioanalytical Chemistry (MARC IX), Kailua-Kona, HI, USA ☀
- 15-20 April: Topical Meeting on the Physics of Reactors (PHYSOR 2012), “Advances in Reactor Physics – Linking Research, Industry, and Education”, Knoxville, TN, USA – <http://www.ans.org/meetings>
- 13-18 May: 13th International Congress of the International Radiation Protection Association (IRPA13), Glasgow, Scotland – <http://www.irpa13glasgow.com>
- 10-13 June: 33rd Annual Conference of the Canadian Nuclear Society and 36th CNS/CNA Student Conference, Saskatoon, Saskatchewan, Canada – <http://www.cns-snc.ca>
- 24-28 June: ANS Annual Meeting, Chicago, IL, USA – <http://www.ans.org/meetings> ☀
- 22-26 July: 8th International Topical Meeting on Nuclear Plant Instrumentation, Control, and Human Machine Interface Technologies (NPIC&HMIT 2012), San Diego, CA, USA ☀
- 2-12 September: International Conference on Radiation Shielding - 12 / RPSD 2012, Tara, Japan □



- 17-21 September: 8th International Conference of Nuclear and Radiochemistry (NRC-8), Como (Lake of Como), North-East Italy, Chairman Mauro Bonardi (Mauro.Bonardi@mi.infn.it) – <http://nrc8.mi.infn.it> (under construction)



- 11-15 November: ANS Winter Meeting and Nuclear Technology Expo, San Diego, CA, USA – <http://www.ans.org/meetings> ☀

2013

- 27-29 May: 3rd Climate Change Technology Conference, Montréal, Québec, Canada
- 9-12 June: 34th Annual Conference of the Canadian Nuclear Society and 37th CNS/CNA Student Conference, Toronto, Ontario, Canada – <http://www.cns-snc.ca>
- 16-20 June: ANS Annual Meeting, Atlanta, GA, USA – <http://www.ans.org/meetings> ☀
- 22-26 September: International Topical Meeting on Probabilistic Safety Assessment and Analysis (PSA 2013), Columbia, SC, USA - <http://www.ans.org/meetings> ☀
- 10-14 November: ANS Winter Meeting, Washington, DC, USA – <http://www.ans.org/meetings> ☀

2014

- 15-19 June: ANS Annual Meeting, Reno, NV, USA – <http://www.ans.org/meetings> ☀
- 9-13 November: ANS Winter Meeting, Anaheim, CA, USA – <http://www.ans.org/meetings> ☀

➔ **Contact ANS International Committee Members by E-mail:**

Please note: This list does not take into account the new appointments made by incoming [ANS President Eric Loewen](#).

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