November 2013
No. 20

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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Contents

From the Chair

Dear Friends,

You may have noticed recently that ANS, like our profession, is going through some changes. Likewise, the International Committee is changing as well. Whether change is viewed as a good or a bad thing, the landscape for nuclear technology has changed dramatically over the past decade.

Who remembers 2005, the launch date of the "nuclear renaissance"? With 30+ new reactors planned in the U.S., the biggest public concern was over where to store the waste from a burgeoning fleet of new Generation III reactors. Financing and project risk had been tackled in the 2005 Energy Policy Act, and new reactors from Westinghouse and GE were on track using a new licensing regime that promised to streamline approval processes. Globally there had been no major accidents since the 1980s, the U.S. was accompanied by Europe, Japan and Korea in expanding our existing fleets and exporting reactors to developing markets in China and India. Oil prices were at record highs, and global warming was a high-profile concern following hurricane Katrina and Al Gore's movie premiere.

Fast forward to 2013 and the UAE is building as many new reactors as the U.S., with a more certain future for UAE's next reactors. The American landscape today is dominated by cheap shale gas discoveries. All of Japan's reactors are shuttered following simultaneous serious accidents, a quarter of Korea's reactors are down due to falsified safety qualifications, India is relying more on indigenous technology than on newly available foreign reactors, and the UK is the new epicenter of new build in Europe. China has now become the epicenter of global new build as is fast becoming a global leader in exports of nuclear technology. Climate change lost its sense of urgency amid global financial crises, and safety has again become the public's greatest concern about nuclear power.

Amid all of these realities, ANS and the International Committee are being challenged to become more responsive to global demands to share the "American Safety Culture" experience. We should all ask ourselves how we can do a better job of becoming more responsive to these challenges. I look forward to working with you as the International Committee responds to these changes.

Best Regards,
Corey McDaniel

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:

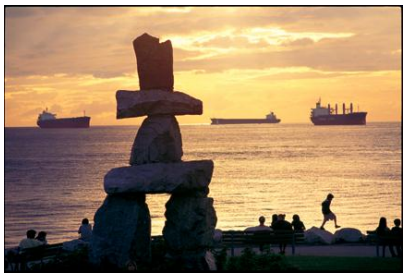
- Background information about the ANS International Committee
- Connections to ANS International Local Sections
- An overview of Society alliances with international organizations (INEA, INSC, and PNC), along with contact information
- Connections to 30 ANS Agreement Societies/Organizations, and
- Current/back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

News from Sister Societies and International News

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

The Canadian Nuclear Society, the Canadian Nuclear Association, and Natural Resources Canada are proud to host the 19th Pacific Basin Nuclear Conference (PBNC-2014) in Vancouver, British Columbia, Canada, under the aegis of the Pacific Nuclear Council!

The theme of PBNC-2014 is "Fulfilling the Promise of Nuclear Technology around the Pacific Basin in the 21st Century". Authors have been encouraged to submit papers on any topic in nuclear technology for oral presentation in technical sessions at PBNC-2014. Papers will be organized in 10 technical tracks.



Please visit the PBNC-2014 website at http://www.pbnc2014.org for information on the exciting developing program, to register, and to reserve accommodation!

The CNS is also planning several other major conferences scheduled for the next 2 years:

- 2014 May 4-6: Nuclear Education and Outreach Workshop 2014 (NEO-2014), Hamilton, Ontario, Canada - http://www.cns-snc.ca/events/neo2014/
- 2014 May 25-27: 10th International Conference on CANDU Maintenance, Toronto, Ontario, Canada - http://www.cns-snc.ca/events/cmc-2014/
- 2015 May 31-June 3: 36th Annual Conference of the Canadian Nuclear Society and 39th CNS-CNA Student Conference, Saint John, NB, Canada, http://www.cns-snc.ca
- 7-16 August 2015: 17th International Conference on Environmental Degradation of Materials in Nuclear Power Plants, Ottawa, Ontario, Canada, http://www.cns-snc.ca
- 1-5 November 2015: 8th International Steam Generator, Heat Exchanger, and Reactor Components Conference, Mississauga, Ontario, Canada, http://www.cns-snc.ca

- **France**

At the IC meeting in June, the French Section of the ANS announced the "Tour de France" of French nuclear facilities, which it is organising for US Professors in 2014. The presentation is reproduced here.

SAVE THE DATE …. Early July 2014

- Arrival Sunday July 6th 2014
- Tour from Monday July 7th till July 12th 2014

Second period under consideration depending on US Professors feedback

Arrival June 29th, Tour during June 30th till July 5th 2014

- Objective
  - *To promote and develop exchanges about the status and knowledge of nuclear development and achievements in France and in the USA in the different technical fields (operation and construction of reactors, fuel cycle, R&D...)*
  - *Continuously enhancing the relationship between the USA and France in the field of Nuclear Education and Training*

Who?

- 12 US-Professors and companions

Where?

- *Throughout France visiting AREVA, CEA, EdF and ANDRA nuclear facilities and …*
- *Fine French cultural and gastronomic venues*

Technical Tour of French Nuclear Facilities 2014 - First Announcement Page 2

The Nuclear Tour de France 2014 …

3

How to Apply?

- A "First Announcement" is available
  - Apply by December 20th 2013
    - Bio, contact information and information on R&D-domains and education activities
  - Final selection will be announced by January 31st 2014
- Contact

Dominique GRENECHE (dgreneche.nuclearconsulting@orange.fr)

Technical Tour of French Nuclear Facilities 2014 - First Announcement Page 4

- **India**

Dr. Gursharan Singh, Secretary, Indian Nuclear Society, sent the following report:

The Indian Nuclear Society is organizing its 24th Annual Conference in Mumbai 2013 December 16-18, on the theme "Advances in Radiation Technology for Societal Benefits". The conference aims at providing a platform for professionals in the field of Radiation

Technology to discuss the current status of research in this field, the state-of-the-art technology available and the current practices in the applications of radiation technology for societal benefits. The conference will have invited talks by eminent experts with vast experience in their respective fields. The conference will highlight the advances made in the following technologies and the societal benefits accrued by their use:

1. Radiopharmaceuticals for health care - Therapeutic and Diagnostic.
2. Nuclear technologies for detection and treatment of cancers.
3. Radiation processing of materials and, hygienisation and shelf life extension of agricultural products
   using gamma irradiators and electron beam accelerators.
4. Nuclear technologies for developing improved varieties of seeds through mutation breeding.
5. Radiation technology applications in Industrial trouble shooting and process optimisation.
6. Isotope Hydrology for water resources development and management.
7. Radiological safety in the application of radiation technologies.

- **Japan**

At the June 2013 meeting in Atlanta, the Atomic Energy Society of Japan made a presentation on Fukushima, reproduced here.

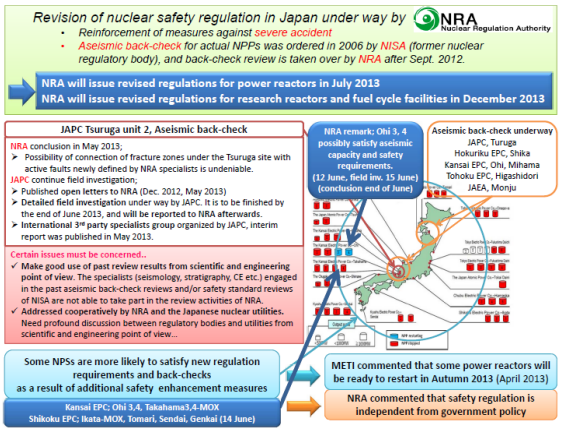
Activities after 3.11

of the Atomic Energy Society of Japan

Atomic Energy Society of Japan
International Affairs Committee
AESJ/IAC

Atlanta GA, June 2013

1. Current status of nuclear energy and nuclear regulation in Japan
2. Activities after 3.11 of Atomic Energy Society of Japan
3. Thank you Japan Relief Fund !



The Government Cabinet approved the "Energy White Paper of 2012 edition".
- Responsible Energy Policy -
(14 June. 2013)

Democratic Party

The Government Cabinet approved the "Future Policies for Energy and the Environment" (decision, Sept. 19, 2012)

Basic principle is the "Innovative Strategy on Energy and the Environment" *(Council decision)*
- Towards realization of a society not dependent on nuclear power - Zero nuclear in the 2030's

Liberal Democratic Party

The Government Cabinet approved the "Energy White Paper 2012" (14 June 2013)

Basic principle is to "take responsibility for the energy policy" taking account the energy security, conservation of living standard, adequate energy mix.
role of nuclear in perspective of energy mix, within a 10-year target period through cautious discussion.

The House of Councilors election in Autumn
The House of Representatives elections ?

1. Current status of nuclear energy and nuclear regulation in Japan
2. Activities after 3.11 of Atomic Energy Society of Japan
3. Thank you Japan Relief Fund !

Accident investigation committee took over NSIC activities

AESJ Nuclear Safety Investigation Committee (April 5, 2011)
- **Technical analysis committee**; accident analysis, nuclear safety issues
- **Radiation effect committee**; radiation and environmental effect analysis
- **Cleanup committee**; decontamination and cleanup, environmental remediation

AESJ « Fukushima Daiichi NPS accident investigation committee » (Aug. 2012)

Purpose; Ascertain root cause of the nuclear accident through scientific analysis. Make recommendations for ensuring and improvement of safety. Translate the recommendation into concrete activities.

Inspection of Fukushima Daiichi NPS (Dec. 2012)

Interim report on Fukushima Daiichi nuclear accident (March. 2013)

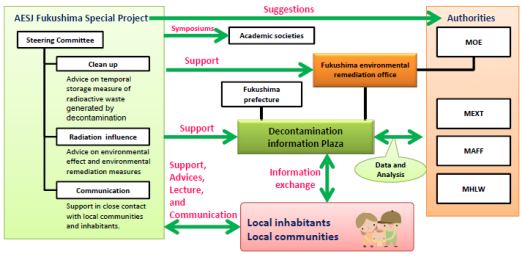
Recomendation e.g. vulnerability and resilience
Conclusion presented at a later date

Review by national and international experts; IAEA, OECD/NEA, **ANS**...

- **Interim report in Japanese** opened to the public **(March 2013)**
- **Draft final report in English** for review by international experts **(Aug. 2013)**
  → ***AESJ would like to ask ANS to review the final report.***
- **Final report on Fukushima Daiichi NPS nuclear accident analyses and early stabilization of the plant (by the end of 2013)**

AESJ "Fukushima Special Project" (started in June 2012)

Purposes; Reinforce AESJ organization. Promote smooth support to local decontamination activities. Advice on on-site / off-site decommissioning related activities.
1. **Technical suggestions** to Mid-and-long-Term Roadmap towards the Decommissioning of Fukushima Daiichi units 1-4 made by authorities and TEPCo.
2. **Support environmental remediation in close contact with local communities**; advise, give lectures to counselors of local communities and volunteers



1. Current status of nuclear energy and nuclear regulation in Japan
2. Activities after 3.11 of Atomic Energy Society of Japan
3. Thank you Japan Relief Fund !

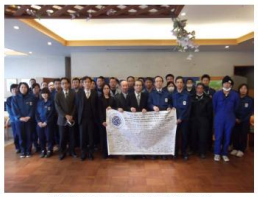
*A total of **US$245,000 from the Japan Relief Fund** and the **Banner from ANS** were received by AESJ and transferred to the Tokyo Electric Power Company. The fund was used completely to improve work environments of Fukushima Daiichi NPS and the living conditions of the dormitories for people working at Fukushima Daiichi and Fukushima Daini NPSs.*

Purchased item lists (the items were purchased by AESJ and sent to TEPCo.);
- Fukushima Daiichi NPS
  - Water servers, Refrigerators, isotonic waters at break rooms → *photo1*
  - Humidifiers → *photo2*
  - TV monitors to post the information
  - TV monitors at break rooms
  - Daily necessaries (mattresses and microwaves)
- Fukushima Daini NPS
  - Refrigerators and microwaves at the canteens for staff and workers
  - Humidifiers
  - Mowing machines
  - Daily necessaries (blankets)
- Dormitories for staff next to the Fukushima Revitalization Headquarters
  - Daily necessaries (microwaves, umbrellas and health equipment)
- Others
  - A rally (a back patting meeting) was held for the first time in spring for staff and workers working at Fukushima NPSs.

Photo1 : Refrigerators settled at a break room and at the exit of controlled area in Fukushima Daiichi NPS



Photo2 : Humidifiers in the offices at Fukushima Daiichi and Fukushima Daini NPSs
The weather in Fukushima is very dry and cold in winter.


ANS Banner handed to TEPCO by AESJ at the Fukushima Revitalization Headquarters (J-village), January 2013
Photos ©Tokyo electric power company

Thank ANS for JRF and Banner !

We are moving forward steadily and step by step to the achievement of restoration from the Fukushima Daiichi NPS accident.
Thank you again for special support and encouragement from ANS.
It is greatly encouraging all of the staff striving each day for restoration from the accident of the Fukushima Daiichi NPS.

- **Kazakhstan**

Dr. Natalya Zhdanova, Ph.D., Executive Director of the Nuclear Society of Kazakhstan, www.nuclear.kz, sent the following news.

Kazakhstan Nuclear Society Celebrates its 20th anniversary

A "round table" meeting on the « Future of Atomic Energy and Renewable Energy Sources» was held at the "Ulba Metallurgical Plant" in Ust-Kamenogorsk. The meeting was devoted to the 20th anniversary of the Kazakhstan Nuclear Society (KNS). Representatives of companies members of the Kazakhstan Nuclear Society, such as "NAC "Kazatomprom" JSC, RSE "National Nuclear Center", the "Institute of Nuclear Physics", the Atomic Energy Committee of the Ministry of Industry and New Ttechnologies of Kazakhstan, as well as representatives of nuclear societies and organizations from a number of foreign countries, i.e., the American Nuclear Society, the Atomic Energy Society of Japan, the Russian Nuclear Society, the French Commissariat of Atomic Energy and Alternative Energy Sources, participated in the event.

The General Meeting

Vladimir S. Shkolnick, President of the Kazakhstan Nuclear Society

In his opening words, KNS President and Chairman of the Board of "NAC "Kazatomprom" JSC, **Vladimir Shkolnik**, noted that the Kazakhstan Nuclear Society was established in 1993 when the country was in a complex situation. Its mandate was to preserve the Kazakhstan nuclear industry and the staff of atomic industry enterprises, and to redirect the work for peaceful purposes.

Since that period, Kazakhstan expressly supported

nuclear disarmament. The peaceful character of the atomic industry in Kazakhstan, its firm course in strengthening the nuclear weapons nonproliferation regime received global recognition and was never noted at such international forums as the Global Nuclear Security Summit, held in Washington, Seoul, the UN General Assembly, and other venues. The participation in this event of delegations of nuclear societies from different countries recognizes Kazakhstan as a world leader in nonproliferation policy.

Vladimir Shkolnik noted that the Kazakhstan Nuclear Society was created in the earliest days of Kazakhstan's independence, when the young country stood for a world without nuclear weapons. The Society has set as one of its goals the promotion of initiatives of **Kazakhstan's President Nursultan Nazarbaev** to strengthen nuclear nonproliferation and safety. An outstanding recognition of Kazakhstan's efforts aimed at reducing the global nuclear threat also came in the participation of **UN Secretary General Ban Ki Moon** and **IAEA General Director Y. Amano** in events such as the Forum "For a Non-Nuclear World" and the international conference "Mayors for Peace" – the continuation of our President's initiative.

For its twenty years of work, the KNS has received recognition not only in Kazakhstan but also abroad. Today KNS has partnerships with nuclear societies of the world's leading countries with a nuclear industry. In 2004 the Kazakhstan Nuclear Society joined the World Nuclear Association, and in 2006 it joined "Women in Nuclear".

Today the Kazakhstan Nuclear Society integrates more than 34 000 people, who work at 47 enterprises in the nuclear industry in the Republic of Kazakhstan.

One of the key areas of the KNS is in information support: it created a website and has published a trade magazine. Special attention can be given to the joint public-awareness efforts of "NAC "Kazatomprom" JSC's enterprises and to KNS's outdoor lectures, held in villages located near mines, its meetings with inhabitants of the regions, its on-line lessons in schools and special educational institutions. An independent ecological examination in uranium mining regions has been initiated. Water, soil and air sampling in areas indicated by local inhabitants is carried out on a regular basis, and research findings are reported to them. Moreover, ecological tours are arranged for representatives of ecological organizations. Participants have an opportunity not only to ask questions to the specialists who work directly at mines, but also to attend the facility itself, to ensure that uranium production is complying with all required norms and rules.
The activities for specialists are both international – for example, the Innovative School "Energy, Water, Chemistry", which is in its second year in Kazakhstan, and where Russian, Japanese and German colleagues participate - and regional, for example, the organization of seminars and meetings on relevant topics.

A Youth Branch has been established to engage young people into the sphere. Conferences for young specialists, "Nuclear Potential of Kazakhstan", are held annually.
Speaking at the round-table "Future of Atomic Energy and Renewable Energy Sources", representatives of foreign delegations shared their experience in the field

of radiation and ecological security, as well as public awareness activity. Colleagues in the nuclear industry congratulated the KNS at its 20th anniversary, and noted their high level of work. A plaque, "Honored Worker of the Atomic Industry of the Republic of Kazakhstan" was awarded at the conclusion of the event. The round-table meeting was followed by a technical tour at the production site of the KazPV project's new plant - «Kazakhstan Solar Silicon» LLP and the facilities of the National Nuclear Center of Kazakhstan in Kurchatov City.

The Nuclear Society of Kazakhstan is an independent not-for-profit organization, a voluntary association of legal entities, the aim of which is to achieve wider knowledge in the field of atomic energy use for peaceful purposes. The Nuclear Society of Kazakhstan was established in 1992, and has a network of branches across the country. The main tasks of the organization are participation in making state research and technology policy in the peaceful use of atomic energy, participation in state and international projects and programs appraisal, satisfaction of professional interests of association members in the latest achievements of nuclear science, techniques and technology, radiation ecology, and setting up a wide information exchange on the peaceful use of atomic energy, education of the public on the practical usefulness of atomic energy, and development of international cooperation.

The Kazakhstan Nuclear Society and the ANS signed a Memorandum of Co-Operation at the ANS Winter meeting, in November 2012.

- **Korea**

Professor Jong Kyung Kim of the Department of Nuclear Engineering, Hanyang University, was inaugurated as the 26th President of the Korean Nuclear Society (KNS). He received his B.S. in Nuclear Engineering from the University of Buffalo, and his M.S. and Ph.D. in Nuclear Engineering from the University of Michigan.

As part of his professional career in the field of nuclear reactor core analysis and radiation safety, he served on the Korea Institute of Nuclear Safety Board of Directors, and as the Associate Director of the Nuclear Safety Advisory Group of the Korean Peninsula Energy Development Organization.

Additionally, he served as General Secretary, Publications Secretary, Editor-in-Chief, Vice President and the 25th Vice president/President elect of the KNS. Currently he is in charge of the Executive Committee of the International Radiation Protection Association.

The 46th KNS Regular General Meeting and Autumn Conference will be held October 23-25, 2013 at Hotel Hyundai Gyeongju, South Korea

The Program of the Conference is:
1. October 23 (Wed) : Workshop
2. October 24(Thu) : Regular General Meeting, Conference, Special Lecture, Banquet
3. October 25(Fri) : Conference

- **Latin American Section**

The Latin American Section of the ANS organized the Symposium "Siting of New Nuclear Power Plants and Irradiated Fuel Facilities" in Buenos Aires, 2013 June 24-28. **ANS President Donald Hoffman** participated and gave a Keynote Address titled "Fukushima Daiichi's Impact in the Nuclear Power Plants Program in the USA".

- **Morocco**

Prof. Lhoussine Erradi, of the Physics Department at Mohamed V. Agdal University, sent the following News from the Moroccan Association for Nuclear Engineering and Reactor Technology (GMTR):

The GMTR Workshop on the Introduction of Nuclear Security in Nuclear Sciences programs at the Moroccan Universities, Fes (Morocco), May 28, 2013

The interest of faculty members in Moroccan universities for the incorporation of nuclear security in the curriculum of nuclear sciences started in March 2012 with the organization of the MENA workshop on nuclear security curriculum development, by the PNS (US Partnership for Nuclear Security), with the collaboration of CNESTEN (National Centre for Energy, Sciences and Nuclear Techniques). This workshop was followed by several actions, mainly the participation of 6 Moroccan Professors in a study tour and train-the-trainer event on nuclear security education, organized by the PNS in 4 leading programs on nuclear security at US universities (28 January - 14 February 2013).

The GMTR workshop was organized with the collaboration of the Faculty of Sciences of the University of Fes and the support of PNS in the framework of following up the study tour in the USA. The main objectives of this workshop were to report to the colleagues (members of the GMTR) about the study tour, to learn more about nuclear security, and to discuss a reference syllabus for a module on the Introduction to Nuclear Security for Nuclear Sciences Masters. An invited talk on the Introduction to Nuclear Security was delivered by Professor J. Harris from the State University of Idaho and Chairman of INSEN.

At the present stage of the development of nuclear activities in Morocco, the workshop recommends, as a first step, including the basics of nuclear security in the existing nuclear sciences curricula (Bachelor, Master's and Engineering Diploma) by the sole initiative of teachers. Another way to proceed right now is to deal with different aspects of nuclear security through conferences and seminars for students at different levels (Bachelor, Master's and PhD). These actions can be implemented as early as next academic year (2013-2014).

Announcement of the PHYTRA3 Conference, 12-14 May 2014

Following the resounding success of the first and second editions PHYTRA1 and PHYTRA2, the 3rd edition of the PHYTRA conference will be organized by the Moroccan Association for Nuclear Engineering and Reactor Technology (GMTR) with the collaboration of the National Centre for Energy, Sciences and Nuclear Techniques (CNESTEN) and the Faculty of Sciences of the University Abdelmalek Essaadi in the city of Tetouan. As for the previous editions, PHYTRA3 is expected to be an outstanding international event in the MENA region, providing an opportunity for researchers, academicians and practitioners in the field of physics and reactor technology to gather, exchange ideas, and present original research contributions and best practices. Since the last edition and after the hesitations caused by the Fukushima accident in Japan, interest in nuclear energy does not cease to increase, and a great number of developing countries including Morocco expressed the intention to include the nuclear option in their national energy plans. In addition to the usual topics of reactor physics, the PHYTRA3 program will include new topics on education and training in reactor physics and nuclear safety and security, which are of great importance for countries which decide to embark on a nuclear power program. The PHYTRA3 website is at **www.gmtr-association.com/phytra3.**

- **OECD Nuclear Energy Agency (http://www.nea.fr)**

High-Level Conference on the Future of Nuclear Energy

The International Ministerial Conference on Nuclear Power in the 21st Century was organised by the International Atomic Energy Agency (IAEA) in co-operation with the OECD Nuclear Energy Agency (NEA), and was hosted by the Government of the Russian Federation through Rosatom in St. Petersburg, Russia, on 27-29 June 2013. The event was attended by some 500 participants representing 89 countries and 7 international organisations. An opening statement by the OECD Secretary-General A. Gurría was delivered by NEA Director-General L. Echávarri, who also moderated one of the conference's four main sessions which focused on Drivers for Deployment of Sustainable and Innovative Technology. Conference participants specifically recognised the significant contribution of the OECD/NEA to safety and economic analyses of nuclear power. At the closing press conference, L. Echávarri stressed *inter alia* that nuclear safety and transparent communication are fundamental to the continued use of nuclear energy.

Nuclear Energy Economics

On 20 September, the NEA organised the 10th meeting of the Working Party on Nuclear Energy Economics (WPNE) of the Committee for Technical and Economic Studies on Nuclear Energy Development and the Fuel Cycle (NDC), which focused on progress on nuclear new build in relation to project structure, supply chain and financing. The meeting was held following the NEA's 19 September workshop on the role of electricity price stability and long-term financing for nuclear new build. The WPNE also provided advice on the other economics-related activities in the 2013-2014 NDC Programme of Work, namely the costs of nuclear accidents and the costs of decommissioning.

- **Slovakia**

Prof. Vladimir Slugen, President of the Slovak Nuclear Society, reported on the **Eastern and Central Europe Decommissioning 2013 Conference**:
The Slovak Nuclear Society (SNUS) recently organized an international conference for professionals involved in all stages of the decommissioning of nuclear facilities (planning, decontamination, dismantling, pre-disposal waste management, waste disposal) and their impact on the environment. The conference was held from June 18 to 20, in Trnava, Western Slovakia. The title of the conference was ***Eastern and Central European Decommissioning (ECED)***. The main objective of the event was to encourage the exchange of experience and best practices in decommissioning of nuclear facilities in Central and Eastern Europe.

The main conclusions to emerge from the conference were summarized in the following closing remarks from Prof. Vladimir Slugen:

"Ladies and Gentlemen:

This year 164 participants were registered at the conference. About 1/3 of them came from abroad. In total, 38 interesting and high-level quality oral presentations and 15 technical posters were presented.

The changes in the nuclear decommissioning sector that have taken place recently in Slovakia and Europe were discussed in detail. It was clearly said that decommissioning issues increase their importance and for many European countries this area is crucial for the social acceptance of nuclear by the public.

ECED2013: Technical Visit of Javys Company

ECED2013 also touched upon sensitive problems associated with decommissioning activities, such as:

- Financing of back-end cycle
- National decommissioning strategies and programmes
- Long-term fuel storage
- International agreement Europe-wide for a common deep repository
- Specialized education and training issues
- Research, innovations and the application of new technologies
- Public acceptance of decommissioning and rad-waste repositories

For Central and Eastern European countries that sometimes share very similar challenges two initiatives promise to be particularly beneficial for the future:

1. According to common experiences from VVER decommissioning – the creation of a master approach and procedures that could be recommended for VVER countries. NPP V-1 can be perhaps be the proper place for verification of these procedures.
2. Education, training and proper knowledge management have specific relevance for decommissioning. Based on the training courses that we run at the Slovak University of Technology we would like to create a European Academy for Decommissioning for VVER countries in collaboration with EC and IAEA. Knowledge and decommissioning skills could be shared on an international level. Input from several organisations present here at the conference would be beneficial. We recommend that specific lessons, practical exercises and on-site training be organised at NPP V-1 in Jaslovske Bohunice, in English and in Russian.

We will try to organize ECED here in Trnava on a biennial basis. I am looking forward to seeing you here in 2015."

- **Slovenia**

By the time of this writing, the Nuclear Society of Slovenia has held its 22nd International Conference Nuclear Energy for New Europe in Bled, Slovenia, September 9-12, 2013. This year the leading theme of the conference was New Generation(s) for Better Future.

- **Spain**

The Spanish Nuclear Society (Sociedad Nuclear Española, SNE) sent the following news:

Once again, the SNE organized the winter session "**Nuclear Power Plants in 2012 - Experiences and Perspectives**", in which Spanish nuclear-industry representatives discussed issues relevant to nuclear power plant operation in the past year (2012) and the future situation of the nuclear industry. The meeting had once again the presence and participation of university representatives, both teachers and students.

This year, the Special Session was devoted to the new Spanish law "New Taxes in the Electrical/Nuclear sector", where speakers presented the impacts of this new law on electrical sustainability. This session was moderated by the current President of the Spanish Nuclear Society, and the guest speakers were **Carlos Salle**, Regulation Manager of Iberdrola Group, and **Luis María Cazorla**, Professor of Financing and Taxes Rights for the University of King Juan Carlos. Their basic messages were based on the economic impacts of the new law on nuclear-energy generation, and their consequences.

The **SNE Ordinary General Assembly** was celebrated right after the end of this session. In the Assembly, the President and Vice-President positions were taken over by **Francisco Lopez** and **José Ramon Torralvo**, respectively.

Nuclear España's Best Article Prize was given this year to the paper "Fukushima: Severe accident", written by **Luis Enrique Herranz Puebla** and **Mónica Garcia Martin**, from CIEMAT. The Commission also gave an Honorable Mention to the issues of the magazine "30 Years of Nuclear Information".

Regarding the activities of the Young Generation Network (Jóvenes Nucleares), it is worth highlighting the organization of the next International Youth Nuclear Congress (IYNC), which will be held in Burgos (Spain) from 6th to 12th July 2014.

Spain's Nuclear Safety Council agreed on May 24, 2013 to extend the deadline for the closure of the Garoña nuclear power plant. It will leave more time for the operator, Nuclenor, to potentially request the extension of the operating licence of Garoña, which is scheduled to stop working next July 6th.

The **39th Annual Meeting** that will be held from 25th to 27th of October, 2013, in Reus is already open for registration. All the relevant information about the meeting is available at: www.reunionanualsne.es. The technical program includes three Plenary Sessions and two Monographic Sessions devoted to relevant current issues related to energy subjects or associated topics. The participants in these sessions include high-ranking national and international experts of recognized prestige in the topics covered by the sessions.

The Plenary Sessions will focus on currently important issues in the energy and nuclear sectors, such as:

- Training, a strategic key to the safe operation of nuclear power plants.
- Internationalization of the Spanish nuclear industry.
- Management and prioritization of regulatory requirements (round-table format).

For the Monograph Sessions, the following two topics were selected:

- Research in the nuclear sector.
- Electric power interconnections and security of supply.

The core of the technical program are the Technical Sessions and the "Learn More About" Courses, in which national and international professionals and experts present their work on relevant projects and scientific studies, and on the progress made in the past year in different fields. The technical papers are presented in parallel oral sessions and poster sessions. The subjects of the papers cover a wide range of fields, such as fission, maintenance, R&D, communication, legal aspects of nuclear power, medical applications, etc.

This year the "Learn More About" Courses will be:

- The electricity market and the home bills.
- Human-error prevention techniques in engineering works.

The meeting also includes activities aimed at informing and educating the general public, e.g. the Basic Course on Nuclear Science and Technology, which is organized by the SNE's Nuclear Youth Committee and is open to students from the city and region, and to anyone else who wishes to learn more about nuclear energy and technology.

The Young Nuclear Generation is pushing actively on education and training of youth, giving new editions of its **Annual Seminar on Safety on Advanced Reactors, Basic**

Course of Nuclear Science and Technology at the ETS of Industrial Engineering of the Polytechnic University of Madrid.

Nuclear España, the monthly magazine of SNE, published since 1984, has devoted its 335th and 339th editions on the "38th Annual Meeting" and the winter session "Spanish Nuclear Power Plants in 2012 - Experiences and Perspectives", in English and Spanish.

SNE has published its annual call for the award of 5 scholarships of € 3,000, each devoted to students enrolled in Master's and/or postgraduate courses in nuclear science and technology. All information is posted on the website of the SNE (http://www.sne.es)

SPANISH NPP NEWS

The contribution of the Spanish nuclear power plants in 2012 to electricity production was 20.6% of the total consumption. Nuclear generation had first place in Spain, followed by coal at 19.3%, wind at 16.5%, gas combined cycle at 14.2%, cogeneration, 13%, hydraulic, 8%, rest of renewables, 5.9% and fuel, 2.5%.

Due to the retroactive application of the **new taxes law,** Santa María de Garoña Nuclear Power Plant shut down at the end of 2012, due to an impact of 153 million € on that NPP.

The remainder of the Spanish NPPs have already started the investment projects derived from **"Stress Test"** studies. The schedule is to finalize them up by end of 2016.

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*!

Mathematics and Computation Division (MCD)

M&C 2013, the International Conference on Mathematics and Computational Methods Applied to Nuclear Science and Engineering, was held at the Sun Valley Resort in Sun Valley, Idaho, May 5-9, 2013. The technical program consisted of high-quality and timely plenary sessions, parallel oral presentation sessions, and a poster session. Nearly 300 people participated in the conference.

The Mathematics and Computation Division is now looking ahead to its next Topical Meeting in 2015:

- 2015 April 19-23: Mathematics and Computation 2015, Nashville, TN, USA - http://www.ans.org/meetings

Reactor Physics Division (RPD)

The Reactor Physics Division looks forward to two upcoming Topical Meetings:

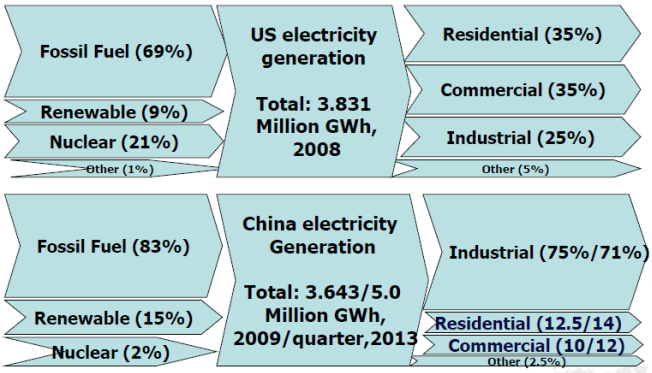
- 2014 Sept. 28 – Oct. 3: Physics of Reactors 2014 (PHYSOR-2014), Kyoto, Japan – http://www.physor2014.org
- 2014 March 29 – April 1: Advances in Nuclear Fuel Management V, Hilton Head, SC, USA http://www.ans.org/meetings

Highlights from the 2013 June Meeting in Atlanta, GA

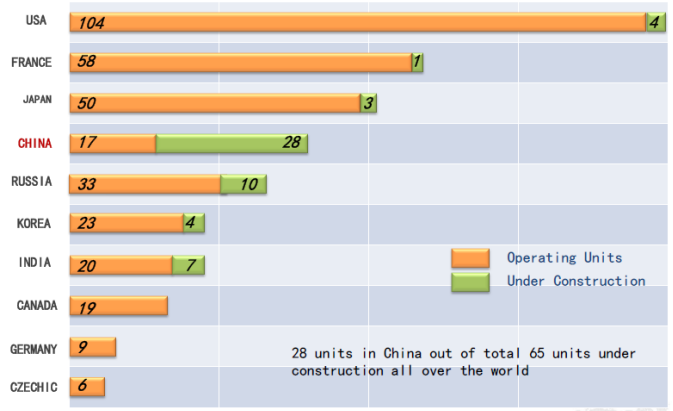
UPDATE ON CHINA'S NUCLEAR POWER PROGRAM

Dr. Gu Shenjie, Deputy Chief Engineer of the Shanghai Nuclear Engineering Research & Design Institute (SNERDI), made a presentation on China's Nuclear Power Program. The presentation is reproduced below.

Energy Supplying & Consuming Structure



Nuclear Power Plant in the World



Nuclear Installed Capacity increasing in China

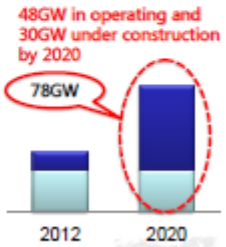
NPPs in Mainland China

Nuclear Power Development Strategy of China

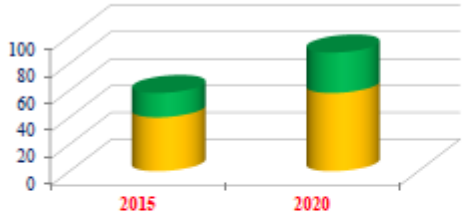
"Mid-Long Term (2011-2020) Development Plan for Nuclear Power" and "Regulation of Nuclear Safety Plan", issued by the Government, Oct.24,2012, outlines the top-level principles and overall plan of the nuclear power program in nearly10 years.

This is to focus on:

- safety-ensured development with high efficiency
- High-leveled safety standard and advanced technology
- AP1000 or its innovative technology based new-build dominant

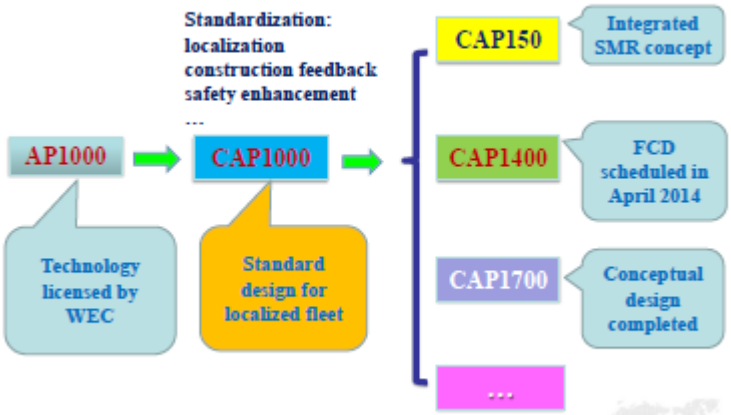


Strategic Opportunity for NPP Development

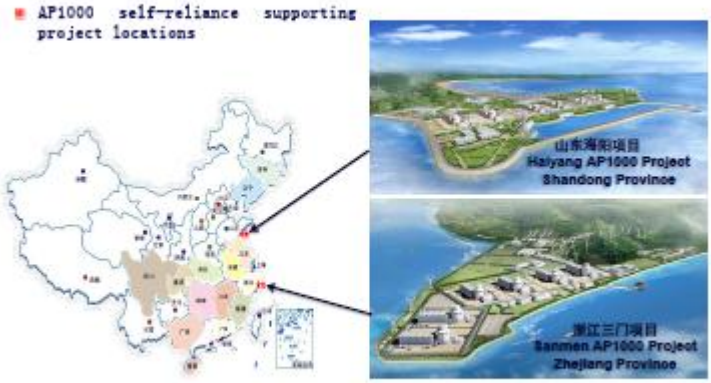


- on going urbanization progress draws increasing demand on electricity
- potential demand on commercial and residential electricity consuming
- environmental pressure urges an effective solution to improve and optimize the unreasonable energy supplying structure
- technology transfer and self-reliance innovation provides a substantial technical condition
- active investment, adequate manufacturing capacity and experienced engineering human resource provides a better industrial condition

Innovation Road Map



AP1000 in Sanmen and Haiyang



AP1000 in Sanmen and Haiyang

AP1000 in Sanmen and Haiyang

AP1000 in Sanmen and Haiyang

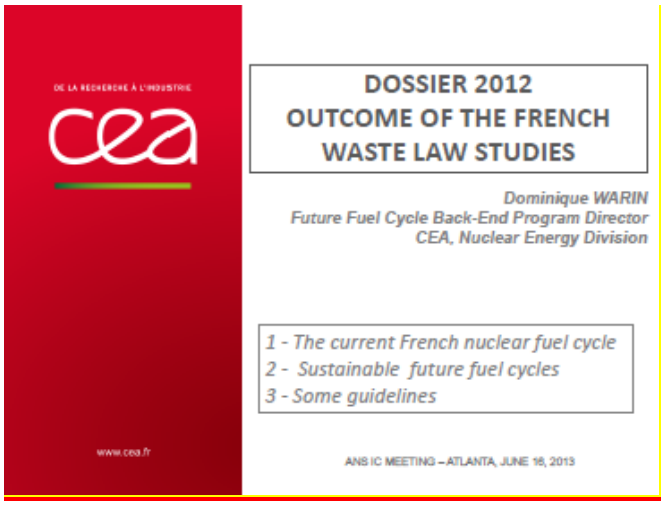
AP1000 in Sanmen and Haiyang

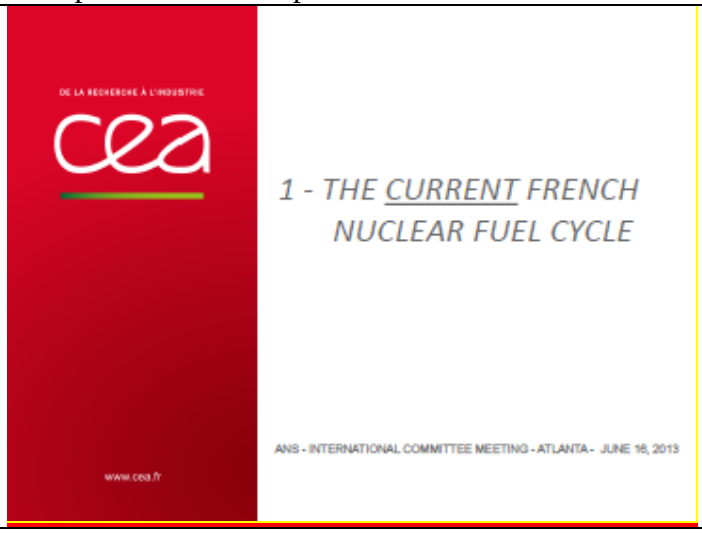
Sanmen:
FCD in March, 2009
expected power to grid in Oct, 2014

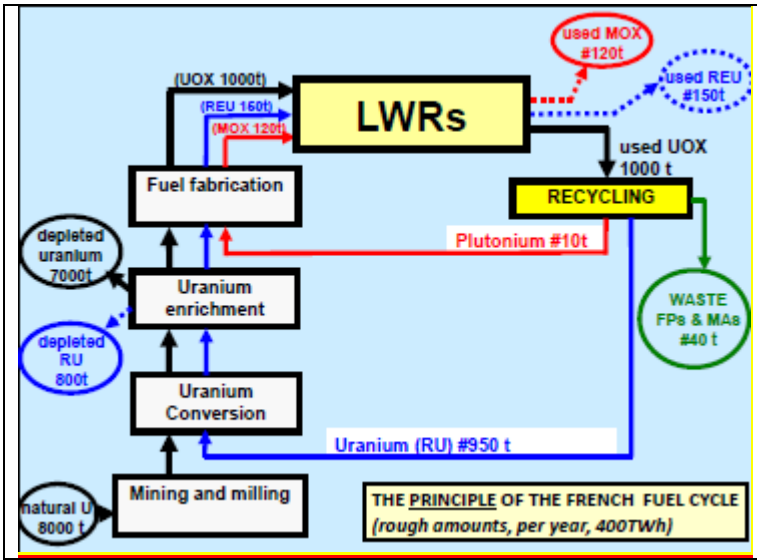
Haiyang:
FCD in September, 2009
expected power to grid in Dec, 2014

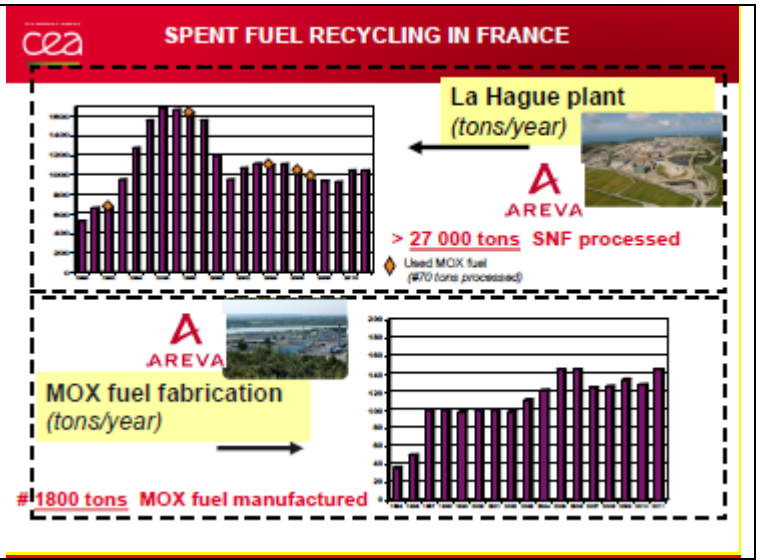
OUTCOME OF THE FRENCH WASTE-LAW STUDIES

Dr. Dominique Warin of the French Commissariat à l'Énergie Atomique, made a presentation on the French Waste-Law Studies. The presentation is reproduced below.

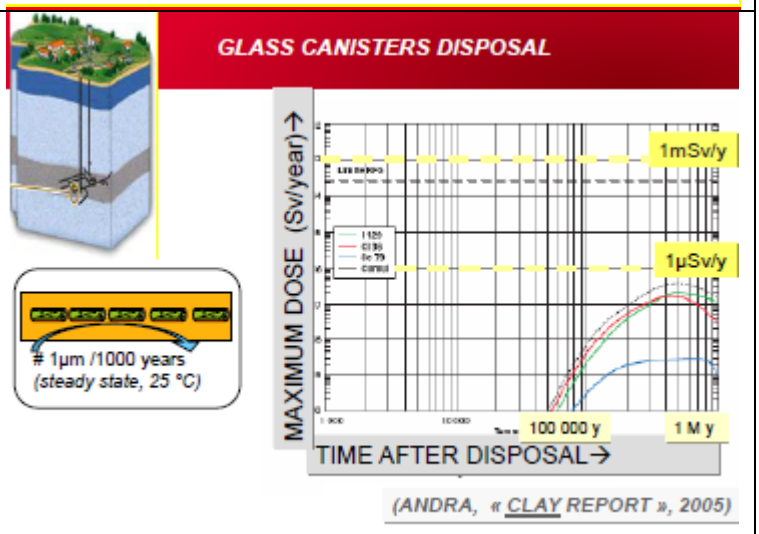


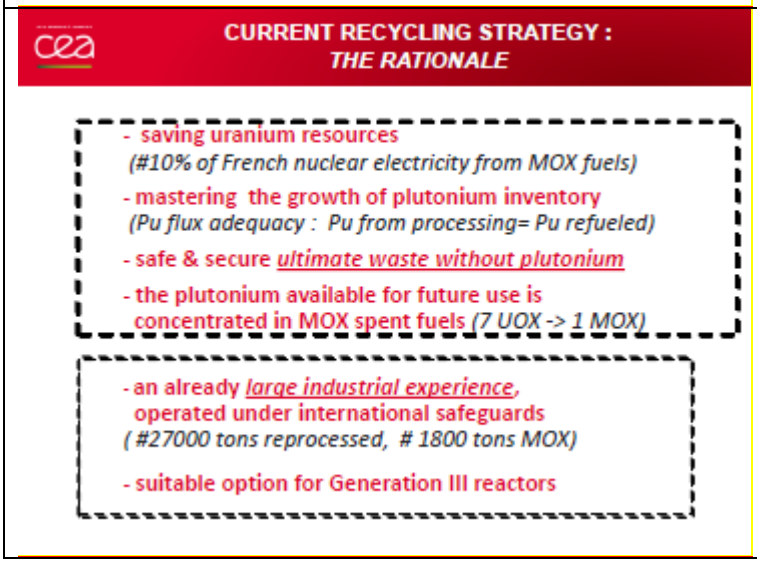



used MOX #120t
used REU #150t
(UOX 1000t)
(REU 160t)
(MOX 120t)
LWRs
used UOX 1000 t
Fuel fabrication
RECYCLING
Plutonium #10t
depleted uranium 7000t
Uranium enrichment
WASTE FPs & MAs #40 t
depleted RU 800t
Uranium Conversion
Uranium (RU) #950 t
natural U 8000 t
Mining and milling
THE PRINCIPLE OF THE FRENCH FUEL CYCLE
(rough amounts, per year, 400TWh)


SPENT FUEL RECYCLING IN FRANCE
La Hague plant
(tons/year)
AREVA
> 27 000 tons SNF processed
Used MOX fuel
(#70 tons processed)
AREVA
MOX fuel fabrication
(tons/year)
#1800 tons MOX fuel manufactured


FINAL WASTE VITRIFICATION
180 liters
#15% FPs
17 000 glass canisters produced
10-15 glass canisters /reactor /per year


GLASS CANISTERS DISPOSAL
1µm /1000 years
(steady state, 25 °C)
MAXIMUM DOSE (Sv/year)→
1mSv/y
1µSv/y
100 000 y
1 M y
TIME AFTER DISPOSAL→
(ANDRA, « CLAY REPORT », 2005)


CURRENT RECYCLING STRATEGY :
THE RATIONALE
- saving uranium resources
(#10% of French nuclear electricity from MOX fuels)
- mastering the growth of plutonium inventory
(Pu flux adequacy : Pu from processing= Pu refueled)
- safe & secure ultimate waste without plutonium
- the plutonium available for future use is concentrated in MOX spent fuels (7 UOX -> 1 MOX)
- an already large industrial experience, operated under international safeguards
(#27000 tons reprocessed, # 1800 tons MOX)
- suitable option for Generation III reactors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www.cea.fr
2 - TRENDS & OPTIONS FOR SUSTAINABLE FUTURE FUEL CYCLE
ANS - INTERNATIONAL COMMITTEE MEETING - ATLANTA - JUNE 16, 2013

NUCLEAR ENERGY IN FRANCE
RECENT HIGHLIGHTS

2006 : FRENCH ACT about *SUSTAINABLE MANAGEMENT OF NUCLEAR MATERIALS & WASTE*
- *recycle (decrease waste amounts)*
- *retrievable geological repository for final waste*

2013 : PUBIC DEBATE ABOUT "ENERGY TRANSITION"
(in progress)

2013 : PUBLIC DEBATE ON "CIGEO" (HLW repository)
(just started in May)

2006 FRENCH ACT: *THE 2012 MILESTONE*

2006 ACT:

December 2012: CEA issued a report to the French government *about "industrial perspectives" of advanced recycling options*

THE REPORT ISSUED BY CEA:

T1 : The guidelines for a sustainable management of nuclear material and waste (and Gen IV systems)
T2 : Separation and transmutation of long-lived waste
T3 : The sodium-cooled fast reactor (and ASTRID demonstrator program)
T4 : Other fast neutron Gen IV systems (and ALLEGRO experimental reactor project)
T5 : Executive summary

www.cea.fr

CEA 2012 REPORT: *THE MAIN CONCLUSIONS*

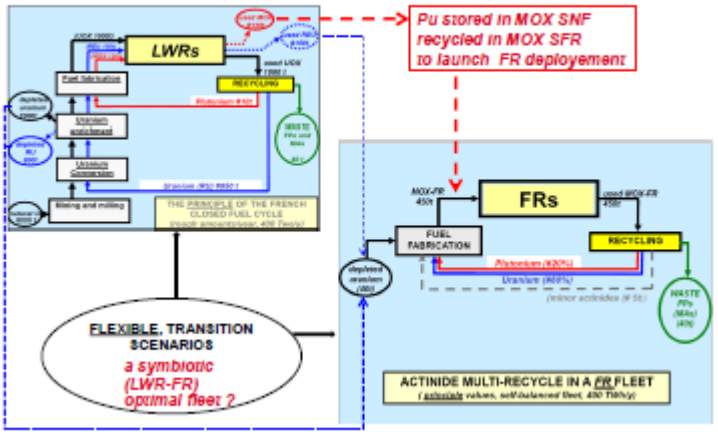
(1) Closing uranium and plutonium fuel cycle, (in a recurrent way) , seems the first condition for a sustainable management of nuclear materials

This means (i)systematic recycle, and (ii)fast neutron reactors

- *to burn and take advantage of plutonium amounts in spent fuels; (avoiding the growth of important un-used SNF stockpiles); (about 7 tons Pu per year in spent MOX fuels)*
- *to allow a drastic extension of the valorization of ^{238}U. (opening the way to possible multi-secular nuclear energy);*

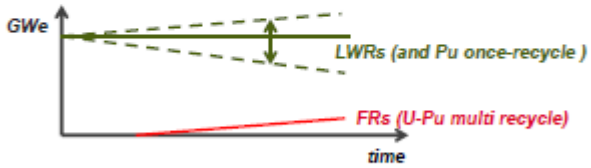
uranium resource utilization yield :
- 0.7 - 0.85% in LWRs
- >90% in FRs

FROM CURRENT FUEL CYCLE... *TO FUTURE FAST REACTORS FUEL CYCLES*



CEA 2012 REPORT: *THE MAIN CONCLUSIONS*

(2) In a first step, a few units of fast neutron reactors should complete the LWR fleet:
- *to recycle plutonium from MOX spent fuel stockpiles (with a limited number of FRs)*
- *while improving FRs industrial maturity in view of next steps*



(3) In the later steps, a larger deployment of FRs could occur, to ensure long-lasting nuclear energy...

CEA 2012 REPORT: *THE MAIN CONCLUSIONS*

(4) fast neutron reactors : two options considered

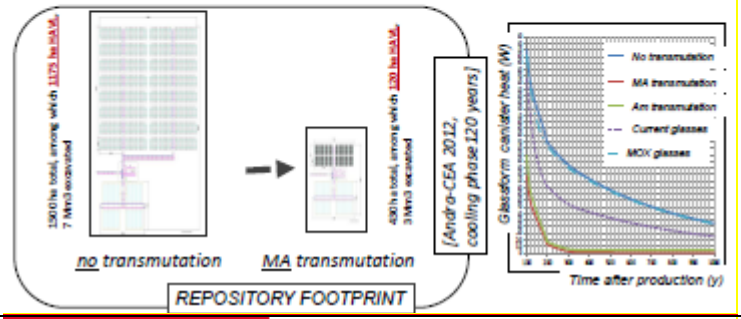
- Sodium Fast Reactor, the reference option : *[ASTRID, the integrated technology demonstrator]*
  - maturity, possible further improvements *(safety, operability, economics)*
  - developed with industrial and international partners

- *Gas-cooled Fast Reactor, a long-term option: attractive potentialities but heavy challenges…*

CEA 2012 REPORT: *THE MAIN CONCLUSIONS*

(5) Minor actinide recycle in FRs could provide an optimization of final waste management:

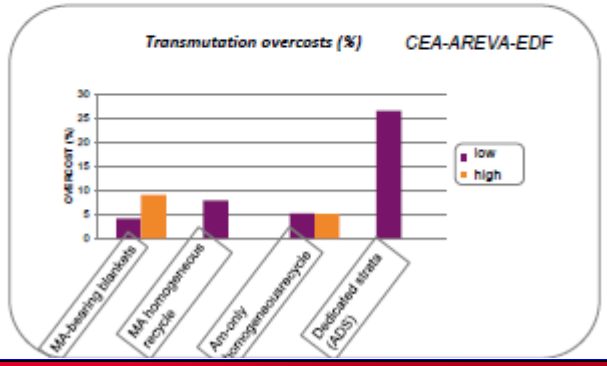
- *by decreasing waste long-term radiotoxicity*
- *by decreasing the repository footprint (Am recycle mainly)*



CEA 2012 REPORT: *THE MAIN CONCLUSIONS*

(6) MA recycle leads to significative drawbacks, especially if Cm is recycled

CEA proposes to focus R&D first on Am recycle.



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3 – CEA RESEARCH PROGRAMS

ANS - INTERNATIONAL COMMITTEE MEETING - ATLANTA - JUNE 16, 2013

1 – PLUTONIUM MULTIRECYCLE

- *CURRENT RECYCLING TECHNOLOGIES: a robust basis for oxide fuels recycle!*

- CAN BE IMPROVED

- Recently : *COEX process*

Cold crucible melter vitrification

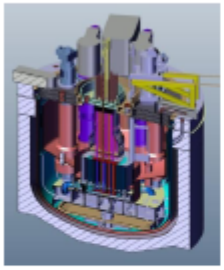
La Hague, 2010

- Tomorrow : *single-cycle, redox-free process? (large potentialities)*

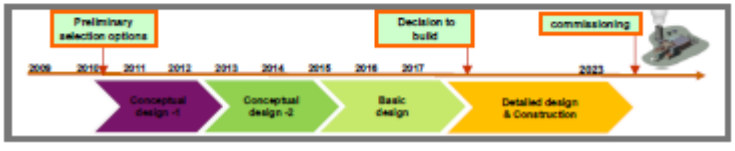
- TO BE ADAPTED

- *FR-MOX fuels (# 25 tons already recycled)*
- *other than oxide fuels ?*

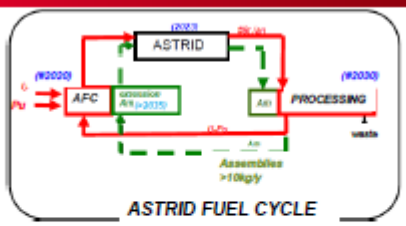
2a - THE ASTRID PROGRAM



- *600 MWe , « pool » type*
- *MOX fuel, transmutation capabilities*
- *innovative design:*
  - self-sustainable safer core
  - *core catcher, residual heat removal*
  - *power conversion system*



2b - THE ASTRID FUEL CYCLE



ASTRID FUEL CYCLE

THE NEEDS

1- fuel fabrication for ASTRID:
(AFC, under design)

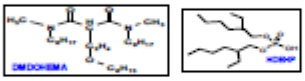
2 - demonstation of Pu (U) multirecycle
(processing ASTRID fuel, several options under consideration)

3 - demonstration of transmutation capabilities
(adaptations for processing and recycling units)

3 – MINOR ACTINIDE P&T

SNF → PUREX /COEX → DIAMEX /SANEX → FPs.

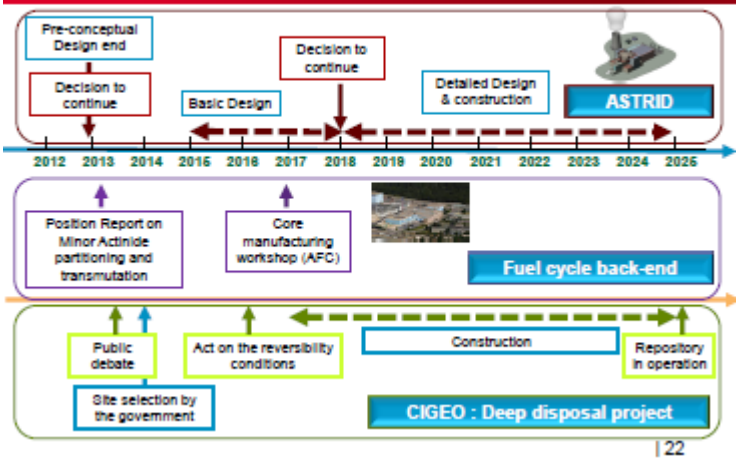
U | UPu | Am (and Cm)



MA recovery innovative processes
have been successfully experimented, *at lab-scale*
[SANEX 2005, GANEX 2008, EXAm 2010] (kgs, genuine SNF)

R&D goals: optimize and pilot-scale approach
separation, MA-bearing fuels fabrication, transmutation:
a long way to reach industrial feasability

THE EXPECTED TPLANNING



22

« En résumé… »

Sustainability is a major stake for 4th generation nuclear systems

This calls for recycling options, and fast neutron reactors

Goals could be to some extent decoupled …
(Pu utilization, U resource extension, MA (Am) transmutation)

…pursuing a « step by step » approach
(U&Pu recycle is the first goal, then possibly Am, …)

The ASTRID program , an opportunity
for large-scale demonstrations

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ANS - IC
ATLANTA
16 JUNE 2013

Dominique Warin
www.cea.fr

THANK YOU
FOR YOUR ATTENTION !

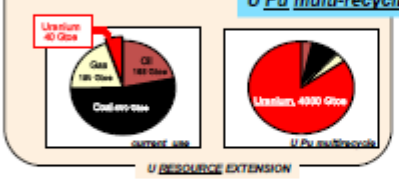
NUCLEAR SYSTEMS:
INCREASING SUSTAINABILITY…

no recycle (« once through »)

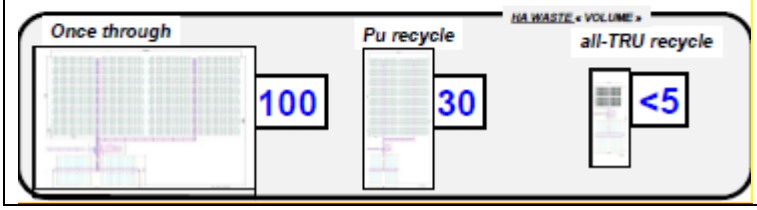
U Pu recycling in LWRs

U Pu multi-recycling in FRs

U Pu, MA (Am,…) recycling…



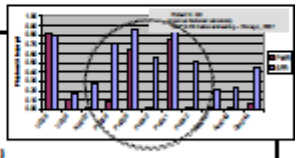
U RESOURCE EXTENSION



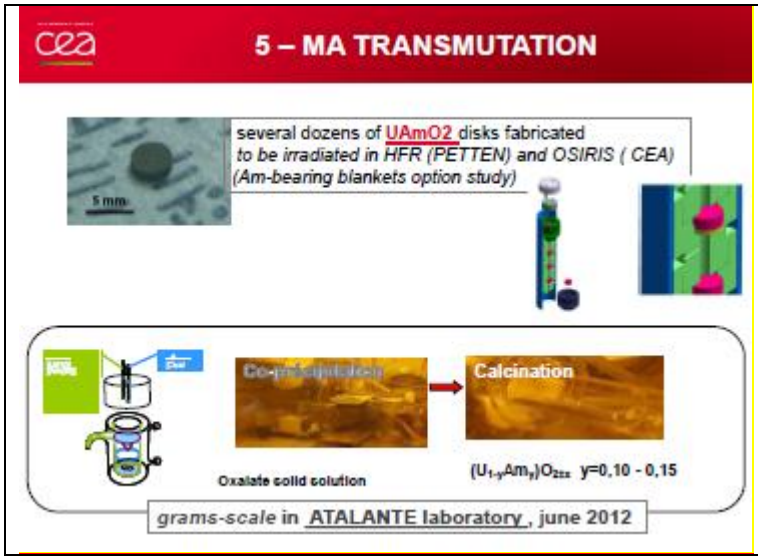
GENERATION 4 NUCLEAR SYSTEMS

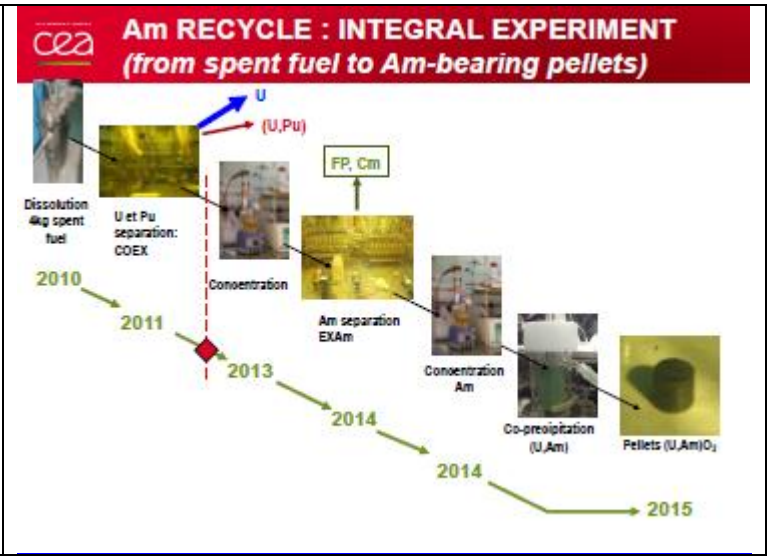
main criteria *for design (GIF, 2002) :*
(1) safety, (2) sustainability , (3) cost

(i) SYSTEMATIC RECYCLE, (ii) FAST NEUTRON REACTORS



- *manage/take advantage of Pu amounts in spent fuels*
- *drastic extension of natural uranium resource (up to > 100)*
- *possible drastic decrease of long-lived elements content in final waste (MA transmutation)*





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.**

2013

- 20-23 October: 63rd Canadian Chemical Engineering Conference, Fredericton, New Brunswick, Canada – http://www.csche2013.ca

- 27-31 October: International Conference on the Safety and Security of Radioactive Courses, Abu Dhabi, United Arab Emirates – organized by the IAEA – http://www-pub.iaea.org/iaeameetings/43047/International-Conference-on-Safety-and-Security-of-Radioactive-Sources

- 27-31 October: SNA + MC 2013, Joint International Meeting on Supercomputing in Nuclear Applications and Monte Carlo, Paris, France – https://www.sfen.fr/SNA-and-MC-2013

- 10-14 November: ANS Winter Meeting, Washington, DC, USA – http://www.ans.org/meetings

- 16-18 December: 24th Annual Conference of the Indian Nuclear Society, Mumbai, India (INSAC-2013) – http://www.indiannuclearsociety.in

2014

- 13-15 February: Radiation Safety in Medicine, Baton Rouge, LA - http://www.ans.org/meetings

- 6-9 April: ICAPP-2014, Charlotte, NC, USA - http://www.ans.org/meetings

- 4-6 May: Nuclear Education and Outreach Conference 2014 (NEO-2014), Hamilton, Ontario, Canada, http://www.cns-snc.ca/events/neo2014/

- 12-14 May: The Third International Conference on Physics and Technology of Reactors and Applications (PHYTRA3), Tetouan, Morocco - http://www.gmtr-association.com/phytra3

- 25-27 May: 10th International CNS Conference on CANDU Maintenance, Toronto, Ontario, Canada (CMC-2014) - http://www.cns-snc.ca/events/cmc-2014/

- 15-19 June: ANS Annual Meeting, Reno, NV, USA – http://www.ans.org/meetings

- 6-12 July: International Youth Nuclear Congress 2014 (IYNC-2014), Burgos, Spain – http://www.iync.org

- 24-28 August: 19th Pacific Basin Nuclear Conference (PBNC-2014), Vancouver, British Columbia, Canada (organised by Canadian Nuclear Society) - http://www.pbnc2014.org

- 24-28 August: 8th International Conference on Isotopes (8ICI), Chicago, IL, USA – http://ici.ans.org/

- 7-12 September: Plutonium Futures – The Science 2014, Las Vegas, NV, USA

- 28 September- 3 October: Physics of Reactors 2014 (PHYSOR-2014), Kyoto, Japan – http://www.physor2014.org

- 26-31 October: Nuclear Plant Chemistry Conference 2014 (NPC 2014), Sapporo, Japan – http://www.npc2014.net

- 9-13 November: ANS Winter Meeting, Anaheim, CA, USA – http://www.ans.org/meetings

2015

- 1-4 February: Conference on Nuclear Training and Education (CONTE15), Jacksonville, FL, USA - http://www.ans.org/meetings

- 22-26 February: 9th International Topical Meeting on Nuclear Plant Instrumentation, Control, and Human Machine Interface Technologies (NPIC&HMIT 2015), Charlotte, NC, USA - http://www.ans.org/meetings

- 29 March – 1 April: Advances in Nuclear Fuel Management V, Hilton Head, SC, USA - http://www.ans.org/meetings

- 19-23 April: Mathematics and Computation 2015, Nashville, TN, USA - http://www.ans.org/meetings

- 26-30 April: 2015 International Topical meeting on Probabilistic Safety Assessment & Analysis (PSA 2015), Sun Valley, ID, USA – http://www.new.ans.org/meetings/

- 3-6 May: ICAPP-2015, Nice, France

- May 31-June 3: 36th Annual Conference of the Canadian Nuclear Society and 39th CNS-CNA Student Conference, Saint John, NB, Canada – www.cns-snc.ca

- 7-11 June: ANS Annual Meeting, San Antonio, TX, USA – http://www.ans.org/meetings

- 7-16 August: 17th International Conference on Environmental Degradation of Materials in Nuclear Power Plants, Ottawa, Ontario, Canada, http://www.cns-snc.ca

- 30 August – 4 September: 16th International Topical Meeting on Nuclear Reactor Thermal Hydraulics (NURETH-16), Chicago, IL, USA - http://www.ans.org/meetings

- 13-17 September: International Conference on Nuclear Criticality Safety (ICNS2015), Charlotte, NC, USA - http://www.ans.org/meetings

- 1-5 November 2015: 8th International Steam Generator, Heat Exchanger, and Reactor Components Conference, Mississauga, Ontario, Canada, http://www.cns-snc.ca

- 8-12 November: ANS Winter Meeting, Washington, DC, USA – http://www.ans.org/meetings

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- 12-16 June: ANS Annual Meeting, New Orleans, LA, USA – http://www.ans.org/meetings

- 13-17 November: ANS Winter Meeting, San Diego, CA, USA – http://www.ans.org/meetings

2017

- 11-15 June: ANS Annual Meeting, San Francisco, CA, USA – http://www.ans.org/meetings

- 12-16 November: ANS Winter Meeting, Washington, DC, USA – http://www.ans.org/meetings

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