

IYNC BULLETIN

International Youth Nuclear Congress



#9

May 2015
www.iync.org

The background of the entire page is a photograph. In the upper half, two large, blue, hyperboloid cooling towers of a nuclear power plant stand against a cloudy sky. Below the towers is a green grassy field. The bottom half of the image is filled with a dense field of bright pink flowers, likely cherry blossoms, which are slightly out of focus in the foreground.

Nuclear For Climate

Editorial



As time goes by, we realize that almost a year has passed since IYNC2014 in Burgos, Spain. For everyone, including the IYNC Officers, the nostalgia of having to leave so many friends and colleagues behind had only just started to subside when we had to begin planning for the next great adventure – IYNC2016 in Hangzhou, China.

The motto for IYNC2014 was “Up to the Challenge” and the IYNC Officers continue to prove that we really are a manifestation of this motto. The first step to the 9th International Youth Nuclear Congress was to form the Executive Committee (ExCom) and local committee in China. After numerous teleconferences made possible by modern technology, the committees were set up and it was time we all met face-to-face. In March 2015, the IYNC ExCom travelled to Beijing, where they met their Chinese counterparts and made some very important first steps in the organization of the 2016 congress. Most importantly, the names, email addresses and voices on the phone could now be visualized as friendly faces.

In 2015, the IYNC Officers will have a tough task. While the first steps for IYNC2016 have already been taken, the organization of a congress we all expect to be twice the size of the previous one will be challenging. To make sure that all attendees (International and Chinese alike) manage to participate in the information, expertise and cultural exchanges as much as possible, we will have to invite as many people from different backgrounds as possible to attend, speak or organize sessions which will bridge the knowledge gap between countries and generations.

To achieve this, IYNC’s Officers and ExCom will travel to different countries and promote IYNC2016 at special forums all over the world. One ExCom member, George Bakkar, already attended and promoted IYNC at the World Nuclear Spotlight in January 2015 in Beijing, China. In the future, we aim to maintain our presence at numerous events around the world. Most notably, at the European Young Generation in Nuclear conference, to be held on 22-25 June in Paris, France, IYNC will hold its mid-term Board of Directors meeting as well as a special ExCom meeting.

In Paris, we will also present our big work-in-progress at a workshop called Understanding Communication Outside the Nuclear Industry and we will present an IYNC report on anti-nuclear groups' view of nuclear energy. With this report, we aim to introduce young nuclear professionals to the arguments against nuclear energy and the positions held by anti-nuclear groups. This report will be the first step towards creating a set of communications tools to help nuclear professionals know, understand and answer environmentalists.

Then, the ExCom plans on travelling to India near the end of 2015. In the same way that IYNC supported the creation of a Young Generation in Nuclear organization in China, which has grown to host next-year's Congress, we would like to help the development of a similar organization in India. For this purpose, we feel that visiting India, meeting with the nuclear industry and the young generation of a country strongly in favor of developing nuclear power is important for the future of IYNC. We would love to see as many participants from India as possible come to IYNC2016 and, who knows, perhaps they can grow to host an IYNC Congress themselves!

But the IYNC activities do not stop there. Two IYNC representatives (Ms. Melissa Crawford and Ms. Ekaterina Ryabikovskaya) as well as a representative of the Chinese Nuclear Society (Ms. ZHANG Zhang) will attend the Women in Nuclear conference to take place 24 to 28 August in Vienna, Austria. As part of IYNC's mission to promote nuclear energy amongst young people, we pay specific attention to gender equality.

The IYNC Officers will have a busy 2015 and we would like to invite all IYNC Members and YGNs to help us in promoting IYNC2016 in Hangzhou! Below you can find a list of conferences where representatives of IYNC will be present!

Date	Conference	Venue
12 - 14 May	North American Young Generation Network	Washington D.C., USA
17 - 21 May	International Conference on Nuclear Engineering	Chiba, Japan
22 - 25 June	European Nuclear Young Generation Forum	Paris, France
4 July - 14 August	World Nuclear University Summer Institute	Uppsala, Sweden
24 - 28 August	Women in Nuclear	Vienna, Austria
9 - 11 September	World Nuclear Symposium	London, England
14 - 18 September	IAEA General Conference	Vienna, Austria
15 - 16 October	India Nuclear Energy	Mumbai, India

Text by **Melissa Crawford,**
Lubomir Mitev

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Cover Photo:

The cooling towers of Temelín nuclear power plant which produced about 18% of the Czech Republic's clean and reliable electricity in 2014 (c) EPA

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IYNC Network Officers

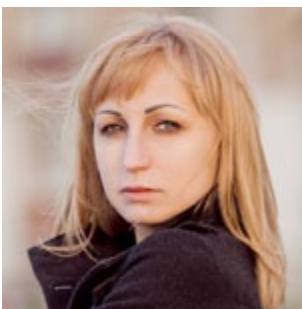


Melissa Crawford President

Melissa Crawford is a graduate from the Nuclear Engineering program at the University of Florida. Melissa participated in internships at Oak Ridge National Laboratory in the USA in 2005 and 2006. Her work was focused on non-destructive identification of the mass and enrichment of Plutonium isotopes in oxide samples. This was performed as a joint project between ORNL and the Joint Research Center in Italy.

After university, Melissa began work on Instrumentation and Control projects with Siemens in the power industry. She worked on analog to digital modernization projects in existing plants and digital design for new build nuclear power plants. Melissa is currently working on commissioning the conventional island of AREVA's Tais-han EPR Instrumentation & Control systems with INP-e engineering firm in Erlangen, Germany.

Melissa has been working with IYNC for over four years and is happy to lead the next term as IYNC President and General Co-Chair of IYNC2016 in Hangzhou, China. The focus during this term will be addressing communication outside the nuclear industry and strengthening collaboration with YGN's worldwide.



Ekaterina Ryabikovskaya Vice President

Ekaterina works as a Managing Editor at ROSATOM corporate newspaper in Moscow. She has a Diploma in Computer Science and currently she is in her sixth year at the National Research Nuclear University MEPhI, majoring in nuclear engineering. Her field of scientific interest comprises high-temperature-reactor fuel and the mathematical modeling of the processes occurring in it during irradiation.

Ekaterina has been involved in IYNC since 2006.



Rahul Srinivasan

Executive Secretary

Rahul is originally from India and has been working in the US as a consultant for global nuclear energy clients for the past four years. As an IYNC officer and founding member of the young generation network in his home country, India, he firmly believes that young nuclear professionals across the globe can collaborate effectively to sustain a strong international nuclear community. Beyond his professional engagements, he is a tennis and soccer enthusiast and enjoys teaching and traveling.



Nicolas Anciaux

Past President

Nicolas is 32 years old and he works as a mechanical engineer for the Westinghouse Electric Company. He received a Master of Science in Mechanical Engineering from the Université Catholique de Louvain (2006) focusing on energy and finite elements analysis.

Nicolas has worked for two years at LMS-Siemens as a structural analyst before starting to work in February 2009 at Westinghouse Electric Belgium where he led engineering projects on European power plants and the AP1000 design. Nicolas has now been working in China since January 2014 on the world's first AP1000 nuclear plant in Sanmen.

Nicolas was responsible for the communications of the Belgian Nuclear Society Young Generation for two years where he helped the Belgian nuclear industry to be more transparent. He then went on to become President of the International Youth Nuclear Congress (IYNC) during the 2012-2014 term and led to develop IYNC's communication through social media, expand the IYNC network to Asia, collaborate with other international nuclear associations and organize IYNC2014 in Burgos, Spain.

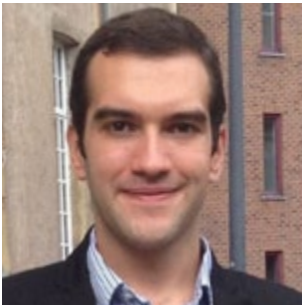
Nicolas believes that Young Generation Networks and IYNC in particular provide the best environment to build a strong network, learn about the different aspects of the nuclear sector and form the future international leaders of our great industry.



Dan O'Connor

Treasurer

Dan O'Connor has been the IYNC Network Treasurer since March 2013. He works for Exelon Corporation, currently at the Limerick Generating Station outside of Philadelphia, PA, in the United States. Dan hails from Albany, NY, and holds a BA in Physics (College of the Holy Cross), an MS in Mechanical Engineering (University of Wisconsin-Madison), and an MBA in Strategic Management (Villanova University). He is very interested in the policies, technologies, and diplomacy helping to safely expand nuclear power in order to responsibly provide electricity for the world's growing population.



Lubomir Mitev

Bulletin Editor

Lubomir is a journalist for the global nuclear news network NucNet. He has a MA in European Studies and an MA in European Politics and Policies. He has been engaged with the topics of energy and environment since 2009 and joined NucNet in 2013. He was brought on as editor of the IYNC Bulletin in 2014.

Lubomir does not belong to a nuclear YGN organization but is engaged with IYNC in order to spread the message of young professionals in the nuclear sector. He is dedicated to the development of nuclear energy and believes the flow of information to the new generation is the best way to help.

Lubomir lives in Belgium and enjoys soccer, movies and hiking.



IYNC Network News

IYNC ExCom Heads to Beijing

The IYNC officers and 2016 Executive Committee met in Beijing, China from 19 to 22 March to continue our planning of IYNC2016 which will be held in Hangzhou 24 to 30 July 2016. We also met members from the Chinese Nuclear Society (CNS) young generation, Mr. Lixin Shen, the Deputy Secretary General of CNS, and Mr. Xin Tianmin, the Director of Chinese Nuclear Power Engineering (CNPE). Additionally, the IYNC team visited the China Institute of Atomic Energy (CIAE) near Beijing to learn about China's experimental fast reactor programme. The trip to Beijing was extremely fruitful from both a professional and academic perspective. We look forward to welcoming the international nuclear community in Hangzhou for IYNC2016. We are sure that you will benefit immensely as active participants.

India's New IYNC Representative

Mr. Nitendra Singh was recently appointed the national representative from India. Mr. Singh takes over from Mr. Sanjeev Sharma who has been India's representative since the past 4 years. IYNC thanks Mr. Sharma for his contributions.

Mid-term Board of Directors

The mid-term IYNC board meeting will be held in Paris on June 21, 2015. All IYNC board members have been invited for the meeting which will be followed by the European Nuclear Young Generation Forum (ENYGF) from June 22-26.



Please like us on Facebook, Twitter (@IYNC), LinkedIn, Wechat and Weibo. We regularly share news about our network and the nuclear community at large

IYNC in 2015: **Visit to Beijing**



Introduction

China joined the Board of Directors of IYNC in August 2013 and quickly rose to become a key part of the organization. In July 2014, at the IYNC2014 in Burgos, Spain, the Board voted to accept China's bid to host the next congress. Preparations began promptly and in March 2015, the IYNC Officers and IYNC2016 Executive Committee visited Beijing to meet with the local committee members and the Chinese Nuclear Society. The meeting took place over two days at the premises of the China Nuclear Power Engineering company and on the third day a technical visit to the China Experimental Fast Reactor was organized.

Meetings in Beijing

On 21 March 2015, the first IYNC2016 Executive Committee meeting was held together

with the representatives of the Chinese Nuclear Society (CNS) Young Generation Network (YGN). The IYNC representatives were welcomed by Mr. XIN Tianmin, Deputy Chief Engineer at China Nuclear Power Engineering Company (CNPEC) and Director General at the Beijing Institute of Nuclear Engineering. Mr. Xin wished the ExCom a lot of success in the organization of IYNC2016 and then passed the word on to Mr. SHEN Lixin, Deputy Secretary General of CNS, who presided over the meeting together with IYNC President Melissa Crawford.

The first topic discussed on the first day of meetings was the conference program. Mr. Luca Capriotti, on behalf of the IYNC Network, and Prof. Dr. CAO Liangzhi, on behalf of the CNS local committee, presented their ideas for the technical tracks, workshops and plenary sessions to take place at IYNC2016. These incorporated the lessons learned from IYNC2012 in Charlotte, USA,

and 2014 in Burgos, Spain. With a large variety of topics which can be discussed, technical sessions to be held and interactive workshop ideas, the main challenge quickly became finding a way to fit all the sessions within the confines of a 24-hour day! In fact, IYNC2016 in Hangzhou could possibly contain about double the number of presentations compared to IYNC2014! While nothing has been definitively decided, Mr. Capriotti and Dr. Cao will definitely have a hard time finding more hours in a day and more days in a week to include all of their ideas! Thankfully, they are both engineers...

The second topic of discussions was the sponsorship opportunities for IYNC2016, presented by Mr. Nicolas Anciaux, past President of IYNC and sponsorship chair for the congress, and Mr. TAN Ke, representative of CNS YGN at China General Nuclear Power Group and local committee sponsorship chair. We can proudly say that more than 35 international and 10 Chinese companies have already announced their interest in sponsoring IYNC2016! In order to make this a successful congress, we appreciate the help of all YGN members in spreading information about the event.

Discussions over the development of China's nuclear sector, the IYNC2016 Congress budget and life in China continued over a dinner hosted by IYNC.

On 22 March, a beautiful, sunny and warm Sunday in Beijing, the second day of meetings took place. The representatives from CNS and the local committee for IYNC2016 presented the venue and floor plan for the congress. A discussion on logistics and international travel dominated the day, with a lot of attention devoted to the special events which will be organized for the international and domestic participants. Near the end of the meeting, Mr. Shengke Zhi and Mr. George Bakkar, the public relation and publications chairs for IYNC2016, presented their ideas for spreading awareness for the congress. One of the ideas proposed

but not yet adopted could result in a sporting event to be held during the congress in which all participants will be eligible to participate!

For those of you who are unsure whether IYNC2016 is worth attending, there are plenty of surprises being planned which should make you think again before denying the invitation! Who knows, you might just meet Bill Gates or win a trophy...

Visit to China Institute of Atomic Energy

On Monday, 23 March, the delegation from IYNC Network, led by Mr. SONG Daiyong, visited the China Institute of Atomic Energy (CIAE). They had a presentation on the historical development of the institute and the research which goes on at the site.

Established in 1950, CIAE laid the foundation for China's nuclear industry. CIAE has made contributions to the development of national defense, nuclear science and technology to become a comprehensive research and development base. The first heavy-water reactor and the first cyclotron in China were built and put into operation in 1958. Scientists from CIAE also played a key role in solving many technical issues related to nuclear technology and led to the successful development of nuclear-powered submarines in China.

As the primary site for reactor research and nuclear fuel production research, CIAE has been focusing on research and development of advanced reactor technology. The delegation from IYNC visited the China Experimental Fast Reactor (CEFR), the first sodium fast neutron reactor in China. When operational, it produces 65 megawatts (MW) thermal power and 20 MW electric power. The reactor has adopted a pool-type design and a liquid sodium heat removal system. The core of the CEFR is fueled with uranium-dioxide for now, but mixed-oxide fuel can also be used in the future.

Mr. YANG Hong Yi, Director of the CEFR, showed the IYNC delegation around the control room of the reactor. At the time, it was offline and reactor operators were monitoring the reactor. Cameras feed live images to the operators so they can visually monitor the situation inside the containment and make sure there are no sodium leaks. In fact, the CEFR has two containments – an outer, concrete building to protect the components from outside influence and an inner vessel made of steel which houses the reactor. The atmosphere inside the second vessel is maintained at 100 percent nitrogen to avoid any contact between the sodium coolant and oxygen, which could cause a fire.

Mr. Yang explained that the CEFR program had at first targeted to have the reactor operate at 40 percent power and then finish by shutting down the reactor. This was achieved soon after the reactor first became critical in July 2010. However, the Chinese government saw the potential for the technology and allowed the experiment to continue. This culminated in the 20 MW reactor operating at full power for 72 hours in mid-December 2014. Mr. Yang says that the CEFR will now be a first step towards the development of sodium reactor technology, with plans already underway to begin construction of the China Demonstration Fast Reactor (CDFR), a 600 MW prototype, in

2017. The project aims to demonstrate that fast reactors can be commercially operational and have economic certainty, while at the same time developing the standards and codes for this type of reactor. Operation is scheduled for 2025 and the design lifetime is foreseen to be 40 years.

The IYNC delegation also visited the Beijing National Tandem Accelerator, one of the most important facilities for nuclear research in China. The main facilities include an HI-13 tandem accelerator which was put into operation in 1987 and has provided more than 100,000 hours of beam time with 40 different ion beams. Around this facility, the Beijing Radioactive Ion-beam Facilities have been added. A new 100 megaElectron-Volt 200 nanoAmpere cyclotron and an isotope separator have been built and can be used together or separately from the HI-13.

The CIAE is an extraordinary facility where new developments in nuclear energy research are happening every day. As the IYNC delegation visited, new office buildings were being constructed on site to accommodate the researchers and scientists who will work on the CDFR project. Who knows, perhaps some of the young scientists participating in IYNC2016 will be directly involved with the project!

IYNC Photo report from Beijing



IYNC Photo report from Beijing



Country Report – China

Text by **Daiyong SONG**



The Chinese Nuclear Society Young Generation Network reports on its latest activities as well as an overview of the latest news from the Chinese nuclear sector.

Chinese Young Generation

The Chinese Young Generation Network (CNS-YGN) is a group created by the Chinese Nuclear Society (CNS) to offer the young nuclear professionals from Chinese nuclear industry the opportunity to further their knowledge and facilitate networking between generations. It was set up after China officially joined the International Youth Nuclear Congress (IYNC) in August 2013 and led by the Youth Working Committee of CNS. The members are from different companies, institutes and universities in nuclear field in China.

The basic strategy for nuclear energy development in China is threefold: thermal-

Activities of CNS-YGN:

2013 – China officially joined the IYNC Board in August

2013 – 1st “Glamour of Nuclear” Middle School Student Nuclear Power Knowledge Contest and “Summer Camp”

2013 – The National Academic Conference: “Prize for Best paper by young scientists” and the “The Nuclear Youth Forum” in Sep. 2013

2013 – “The Day of National Science Popularization”

2013 – IYNC Delegation Visit to China: Beijing, Sanmen, Shanghai, Shenzhen.

July 2014 – CNS-YGN won the bidding to host the 9th International Youth Nuclear Congress (IYNC2016), which will be held in Hangzhou, China, from July 24 to July 31, 2016.

March 2015 – CNS-YGN hosted the first Executive Committee meeting for IYNC2016 in Beijing, China. During the Ex-com meeting, the technical tour to China Experimental Fast Reactor (CEFR) in China Institute of Atomic Energy was organized.

neutron reactors, fast breeder reactors and controlled nuclear fusion reactors.

China officially joined the International Youth Nuclear Congress (IYNC) in August, 2013. Young professionals from Chinese Nuclear Society (CNS), institutes, companies, universities have been selected as core members of CNS Youth Working Committee to establish the Young Generation Network in China (CNS-YGN). More information can be found on IYNC China Weibo (<http://weibo.com/IYNCCChina/home>).

China is a new comer to the IYNC Board but is well developed in nuclear technology application, especially in nuclear power generation. The CNS-YGN is willing to be involved in the IYNC activities, to contribute to the technical exchange among young professionals all over the world and to share the experience of working in the nuclear field.

Nuclear Power in China – by Lubomir Mitev

In mainland China, there are 27 nuclear power units connected to the national grid and 22 units under construction. The reactors under construction in China account for 40 percent of the total number being built globally. China's National Development and Reform Commission has indicated the intention to raise the percentage of electricity produced from nuclear power from the current 2.4 percent to around 6 percent by 2020. This will require the capacity to be increased to 88 GW, including 58 GW in operation and 30 GW under construction.

China finished 2014 with a strong push to achieve its nuclear energy targets. On 16 December 2014, Fangjiashan-1 in Zhejiang province entered commercial operation after having operated at full power for 168 hours. Not long afterwards, on 25 December, Fangjiashan-2 achieved first criticality and was connected to the grid in mid-January 2015. Less than two months after the first Fangjiashan unit, unit 2 achieved commercial operation on 12 February, adding 1,000 megawatts to the Chinese nuclear capacity.

Furthermore, Xu Yuming, Deputy Secretary General of the China Nuclear Energy Association, said earlier this year that 14 gigawatts (GW) of nuclear power will be put into operation in 2015 and 2016, bringing the total installed capacity to 34 GW, surpassing South Korea and Russia. Within the same week at the end of March 2015, three nuclear units connected to the Chinese grid – Yangjiang-2, Hongyanhe-3 and Ningde-3. Reports also say four other units – Yangjiang-3, Fuqing-2, Changjiang-1 and Fangchenggang-1 – are conducting commissioning tests, with first criticality scheduled for some time in 2015 or early 2016.

Construction of nuclear reactors in China continued to gather speed. In February 2015, for the first time since the March 2011 accident at Fukushima-Daiichi, China's State Council gave its approval for new nuclear units to begin construction. Hongyanhe-5 and -6 will be of the Generation III ACPR-1000 design and pouring of concrete for unit 5 began in late March.



The Risks of Nuclear Are ‘Greatly Exaggerated’

Environmentalist Bruno Comby, founder of the lobby group Environmentalists For Nuclear, says the anti-nuclear lobby has transformed a very safe energy source into a huge problem by distorting reality. He spoke to IYNC about risk, radiation and the ‘problem’ of nuclear waste.

What is Environmentalists For Nuclear?

BC: Environmentalists For Nuclear is a non-profit organisation founded in 1996 which has over 12,000 members and supporters in 65 countries. We have branches in several countries, but our headquarters are in France. We have helped convince a number of senior environmentalists about the need for nuclear. Patrick Moore, one of the founding members of Greenpeace and executive

director of Greenpeace International for more than 15 years, left Greenpeace in 1986 and has since come to support nuclear energy, as have other environmentalists including James Lovelock and Stewart Brand.

How did you become an environmentalist for nuclear energy?

BC: I trained as a nuclear scientist. I wrote a book on nuclear energy and gave lectures to members of the environmental movement, and discovered there were mistakes and misunderstandings about nuclear power. It is the cleanest energy on Earth, but is considered the most polluting. So I set out to tell the environmental community about the benefits of nuclear power.

So you are convinced nuclear power is safe?

BC: Yes, of course. There have been accidents, just as we have had accidents in any other industry. But the accidents are not as bad as people think. If you take Fukushima-Daiichi, not a single person died due to radiation exposure. So, if the worst accident that can happen is an accident that kills no one, I think it is a safe industry.

Authorities say almost 20,000 people died as a result of the earthquake and tsunami, which was a terrible disaster. Only four people died at the Fukushima-Daiichi nuclear station. Two stayed in the basement and drowned, one was at the top of a crane when the earthquake struck, and one had a heart attack while he was taking part in the recovery operation. None of them died due to radiation exposure. Less than 10 people received a level of radiation exposure higher than the safety limits, but still far below the doses which would seriously endanger their health.

What do you think about the relationship between increases in safety measures and the increasing cost of construction?

BC: The cost of nuclear power has gone up, that is true. The positive side of this is that nuclear technology is safer than it was in the early years of its development. It has always been a safe energy, even when you include the people who were affected as a result of the Chernobyl accident. It is still the safest energy source. But the fact is it can be even safer, which has resulted in increases regulation and that, in turn, has led to higher costs.

Sometimes, the cost is almost unreasonable – the industry can spend billions just to avoid one injury. It seems almost absurd when you consider that you can save one life in Africa with a few dollars. This is a paradox. I think it is sometimes justified to spend more on safety issues, but it can become overly exaggerated.

I think there is also a misconception here.

The radiation dose limits which we are concerned with at nuclear power stations today are for manmade, or technical radiation sources. There is no regulation for exposure to radiation from natural sources. A person can walk in nature and be exposed to high doses of radiation and it is not forbidden. On the other hand, we are forced to spend millions on preventing the exposure to a few millisieverts in a nuclear power station. If radiation regulations are developed to protect human health and not just to make nuclear energy more expensive, then they should apply to the total exposure – industrial plus natural.

Are you saying there are risks from natural radiation?

BC: I have measured natural radiation in many places. I travelled to the village of Ramsar in Iran, which is one of the most radioactive inhabited areas in the world because of nearby hot springs which bring radium to the surface. I measured 150 microsieverts per hour with my dosimeter. This is much higher than the dose workers are exposed to in nuclear power stations. Yet, there is no regulation for the local population. The building materials villagers use also contain high levels of radium and the hot spot – the place where the highest readings have been recorded – is inside a primary school. The school, which has been closed, is the highest natural radiation hotspot on the planet. People live healthily and normally there.

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I met the director of the school. He built his house with his own hands – it is the most radioactive house on Earth because it is made from materials containing high levels of radium. In his kitchen, I measured 130 microsieverts per hour. When I met him he was already eight years older than the average lifespan in Iran. If he dies, it will not be an early death due to radiation exposure. This just goes to prove that industrial radiation alone has no health significance and regulations should be adapted to accept this.

Do you think there is a solution to the problem of nuclear waste disposal?

BC: There is no 'one single solution' to the issue of nuclear waste – there are several. However, you first have to recognise that nuclear waste is not really a problem. There is almost none of it. The best energy is the one that would produce no waste at all and nuclear energy is the one source that comes closest to this. One gramme of uranium-235 produces as much energy as one tonne of oil, coal or natural gas. This relation is a factor of one million, which means that the scar we inflict on the Earth when we mine for ura-

It is the most radioactive house on Earth... in his kitchen, I measured 130 microsieverts per hour

nium is a million times smaller than when we pump oil or gas from wells underground.

When it comes to the production of waste, nuclear energy is even better than the one million to one ratio. The density of nuclear waste is much higher than that of other energy sources. In terms of mass, nuclear waste is about one million times less than fossil fuels. When you take into account that gases are about 1,000 times less dense than solids, the difference in volume is a factor of several billions. This is a huge environmental benefit which should be to the credit of nuclear energy.

Another positive side of nuclear waste is that it is self-degradable, which is not the case with toxic chemical waste produced in much higher quantities in other power plants. In fact, nicotine is as toxic as uranium or plutonium, yet it is cultivated and produced in much larger quantities and is sold to be inhaled. Six to 10 million people each year die from nicotine, while nuclear waste is confined and it is not put back into the biosphere. The health impact of nuclear waste is much less than other toxic chemicals.

Do you think the nuclear industry pays enough attention to the topic of risk?

BC: I think the risks of nuclear power are vastly exaggerated. What happens when you talk about these issues too much is that people become hyper-conscious of the risk and end up believing that this is a dangerous industry. Even though nuclear is growing in

There is no 'one single solution' to the issue of nuclear waste - there are several

some countries, it has disappeared in others because of this perception of risk. Nuclear is not growing as fast as it should to help our transition from dangerous and polluting energy sources to clean energy sources. We could do a lot with nuclear power, but to do so we have to stop talking about the dangers so much when they are so small.

Opponents have transformed a very safe solution into a huge problem. They have done this by focusing only on the problems. They have distorted reality and this is not the correct way to present information to the general public.

How do you see the future of nuclear energy?

BC: In the long term, it will be a brilliant future because there is no choice. We will start running out of cheap oil and whatever is left will be concentrated in a small number of

unreliable states. Huge portions of the planet will be deprived of oil or will not be able to afford it. China – the world's biggest energy consumer – burns mostly coal to produce its energy. Climate change is becoming worse every day with carbon dioxide increasing in the atmosphere by two parts per million every year. The situation is changing fast and in a couple of decades we will not be in the same world.

Nuclear energy is only 50 years old. Compared to the railway industry, we see a similar line of development. In the 1880s, the railway industry was seen as very dangerous and some cities went as far as to ban locomotives. They thought it was too dangerous to have a train station. Yet now we have high-speed rail, which is affordable and safe. Most of all, it is convenient and clean, especially when it is powered by nuclear energy. Nuclear energy is in the first phase of its history and some parts of the population have not yet understood the benefits it can bring.

Background

Bruno Comby trained as a nuclear engineer at the Ecole Polytechnique and Ecole Nationale Supérieure de Techniques Avancées de Paris. He established Environmentalists For Nuclear in 1996. See www.ecolo.org



Nuclear For Climate

Nuclear4climate is a grass roots initiative created jointly by the French Nuclear Energy Society (SFEN), the American Nuclear Society (ANS) and the European Nuclear Society. With the United Nations Framework Convention on Climate Change (UNFCCC) CoP 21 climate talks due to take place in Paris in December 2015, this initiative is right on time. It has brought together nuclear scientists from all corners of the globe in their efforts to promote the environmental credentials of nuclear energy.

Nuclear4climate reflects the concerns and supports the central conclusion drawn by the majority of climate experts, namely that human activity has contributed directly to climate change. This conclusion was unequivocally stated in the peer-reviewed

5th Assessment Report published by the IPCC (Intergovernmental Panel on Climate Change). The International Energy Agency (IEA) also recognized this fact in a report that it published in November 2014, in which it states that nuclear energy has avoided the equivalent of two years' worth of CO2 emissions since 1971.

At least 80% of the world's electricity must be low-carbon by 2050 to keep the world within 2°C of warming, according to the IPCC. This is a massive global

challenge that requires the use of all available low-carbon energy technologies, including nuclear energy. Today, there are more nuclear reactors under construction than at any time in the last 25 years. According to the OECD, the so-called BRIC countries –

Brazil, Russia, India and China – are leading the way in nuclear technology development and deployment.

Nuclear scientists know this. It is important that we pool our resources and amplify our voice so that decision-makers are left in no doubt that nuclear is part of the solution to fight climate change. The main objectives of the initiative are to promote this reality, to reinforce the sense of pride that the nuclear community derives from knowing that it is contributing to the future of the planet, and to ensure that the final protocol that emerges from CoP 21 emphasises that all countries are free to choose nuclear energy as one of the available options for reducing carbon dioxide emissions

In economic terms, nuclear energy has high capital costs. But so do most renewable energy technologies. The long-term operation of nuclear power plants and the stable production costs mean that nuclear is one of the most competitive low-carbon options available. It is essential that politicians promote an energy policy supporting of investments in long-term, capital-intensive projects, especially for nuclear energy projects in deregulated markets.

Japan can serve as an example of the effect nuclear energy has on the economy of a country. Data from the Japan Atomic Industrial Forum shows that when all nuclear stations shut down after the Fukushima-Daiichi accident, the gap in energy production was filled by natural gas and coal, both imported fossil fuel energy sources. This resulted in about ¥3.7 trillion (\$30 billion) per year in additional expenses to purchase these fuels. At the same time, emissions of carbon dioxide increased by about 10 percent or 120 megatonnes, approximately equivalent to half of Spain's annual emissions.

And the Young Generation is part of it!

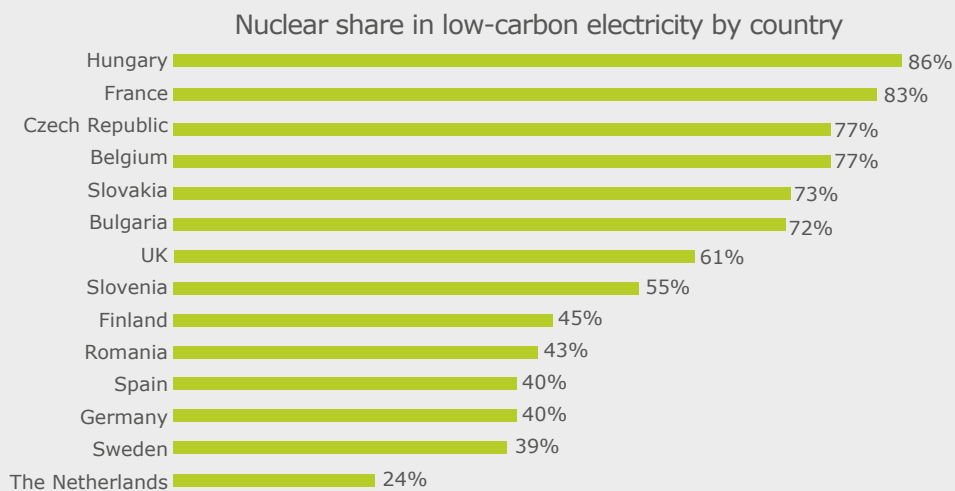
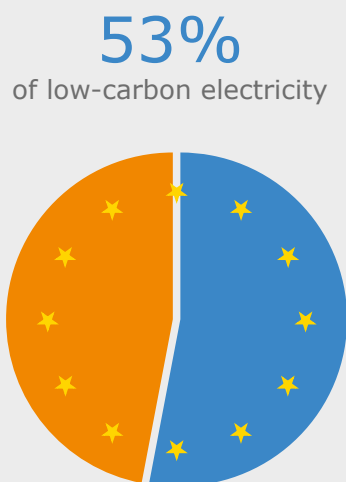
The International Youth Nuclear Congress (IYNC), the European Nuclear Society Young Generation Network (ENS YGN), the Romanian Nuclear Energy Association (AREN) and the French Nuclear Society Young Generation Network (SFEN JG) are involved in this initiative. This action can only be a success if it includes young people of the nuclear industry from all over the world. Join the team!



NUCLEAR AND CLIMATE CHANGE



Generating more than half of Europe's low-carbon electricity

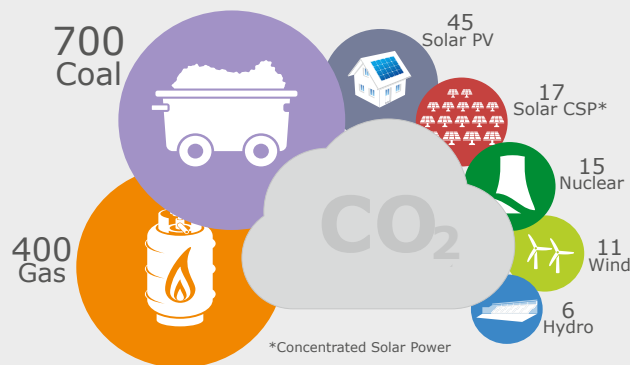


Source: Eurostat, 2014

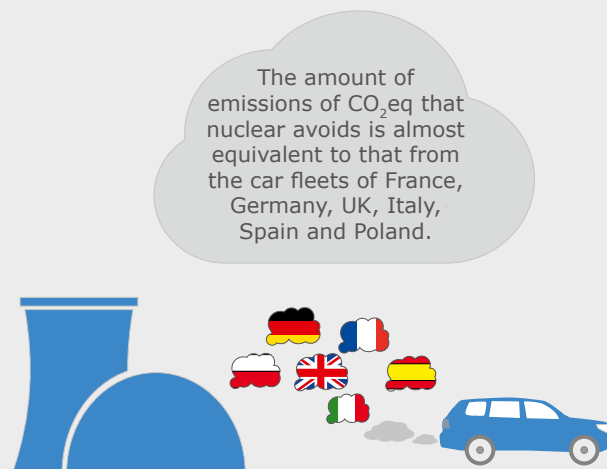
Contributing to the fight against climate change by avoiding CO₂ emissions

The amount of CO₂ emitted by nuclear energy is comparable to that of renewables.

Comparison of greenhouse gas emissions CO₂ eq/kWh

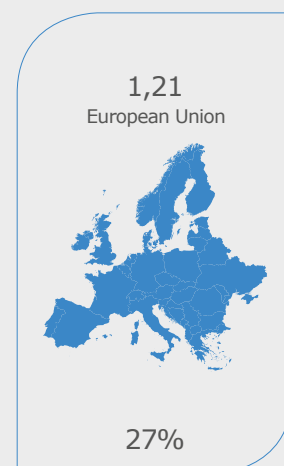
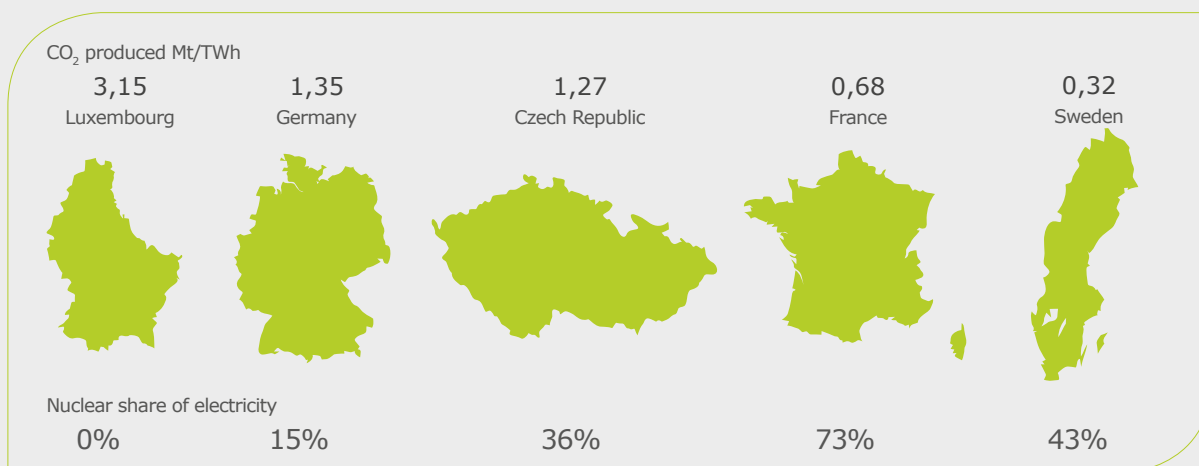


Source: European Commission, NEEDS Project, 2009



Source: Eurostat, 2014

Helping EU Member States meet their CO₂ reduction target



Source: Eurostat 2014

Country Report – South Korea



The Korea Young Generation Network reports on its latest activities as well as an overview of the latest news from the nuclear sector.

Korea Young Generation Network – by Yeon-Gun Lee

A regular KYGN (Korea Young Generation Network) meeting is held twice a year at the same time as the KNS (Korean Nuclear Society) conference meeting in the spring and autumn. The latest KYGN meeting was held on 29 October 2014 in Pyeongchang, and approximately 40 members from universities and industry attended. The participants shared information on recent issues in the Korean nuclear industry and discussed the future activities of the KYGN. At the moment, the leading members of the KYGN

are focused on finding ways of invigorating our organization, in particular by motivating the KYGN members and establishing other meaningful regular activities.

In spite of a national celebration when Korea Electric Power Corporation won the tender to construct the first nuclear power station in the UAE in 2009, the Fukushima-Daiichi accident which occurred in close proximity to South Korea devastated the public's acceptance of nuclear power. However, according to the Basic Energy Plan adopted in 2014, the Korean government decided to set the share of nuclear power capacity to 29 percent of total power generation in 2035. This requires the increase in the total nuclear capacity. Fortunately, public acceptance towards nuclear power has improved in recent times.

According to a survey conducted by Real-meter in January 2015, 37 percent of all



respondents said that the current portion of nuclear power should be maintained, and 27 percent answered that the number of nuclear stations should be increased. Almost 30 percent of the respondents said that the share of nuclear should be reduced. Furthermore, it was revealed that Koreans see nuclear safety in a negative light; more than half (53 percent) said that domestic nuclear stations are not safe. The corruption scandal in Korea's domestic nuclear industry in 2013 and the 2011 Fukushima accident are believed to worsen public acceptance for nuclear energy.

Nuclear Power in South Korea

In 2014, the nuclear power station hacking raised the issue of cyber security and its importance for nuclear safety. In December, an unidentified hacker, claiming to be an activist against nuclear power, posted data about nuclear power plants, including their blueprints, on the internet. The hacker threatened to destroy the facilities while demanding they be shut down. The state nuclear power operator KHNP insists that

the information published online does not have any serious implications for national or energy security. Investigations revealed that the hackers obtained the blueprints of nuclear power stations by breaking into the email accounts of KHNP officials and their subcontractors.

In February 2015, the Nuclear Safety and Security Commission (NSSC) of South Korea decided to extend the lifetime of the second-oldest nuclear reactor in the country, Wolsong-1 in Gyeongju, until 2020. During the process of granting the lifetime extension permit for the Candu 6 unit, residents and environmental organisations expressed concerns over its safety, sparking fierce controversy. Environmentalists and a few experts have insisted that Wolsong-1 fails to meet technical standards set by the IAEA and, based on a private inspection team's review, safety cannot be guaranteed if the reactor continues to operate. Korean environmental NGO Collective Action for a Nuclear Free Society called for the reactor's life-span extension to be nullified. KHNP and government are going to prepare follow-up measures to fix problems revealed in the review process and to restart the facil-

ity, making sure safety is a top priority.

Furthermore, in March 2015, the leaders of South Korea and Saudi Arabia agreed to seek opportunities to build more than two small- and medium-sized nuclear reactors in the Gulf. The agreement aims to develop South Korea's SMART reactors and commercializing the technology in order to jointly enter the global market. Generating a rated thermal output of 330 MW, SMART obtained Standard Design Approval (SDA) on 4 July 2012 from the Korean nuclear regulatory authority. Under the agreement, the two countries are set to conduct a

three-year preliminary study to review the feasibility of constructing SMART reactors in Saudi Arabia by 2018.

Also in February, South Korea's newest nuclear reactor connected to the national grid. Shin Wolsong-2, a domestic OPR-1000 reactor, is expected to become commercially operational in July. Another unit which is under construction, Shin Kori-3, has received approval from the NNSC in a draft inspection report saying it "complies with the relevant technical standards". The reactor will be the first of four APR-1400 units to become operational in South Korea.

Country Report – Sweden

The Young Generation Sweden reports on its latest activities as well as an overview of the latest news from the nuclear sector.

Young Generation Sweden – by Petty Cartemo

YG Sweden started its 21st round of yearly activities in February 2015. Approximately 60 employees from the industry were sent by their companies to participate in the networking program initiated by YG. In topical group of about 7 people, all members decide upon a number of study visits to relevant nuclear or related sites to gain a more complete understanding of the industry.

The represented companies in 2015 are: Westinghouse, Vattenfall, Ringhals, Forsmark, Oskarshamn, SKB, Studsvik, ÅF, Reijlers, Alstom and GE Hitachi. The topical groups in 2015 are: Nuclear Waste, Decommissioning, Future, Knowledge Exchange,

Environment, Safety, Nuclear Development. The annual meeting of the YG board is scheduled for June 2015. In the autumn of 2015, the annual seminar for YG participants and alumni will be held in Oskarshamn (hosted by OKG and SKB).

Nuclear Power in Sweden

The state-owned company Vattenfall – operator of nuclear units at Forsmark and Ringhals – has stopped evaluating the possibilities for new-build in Sweden for the moment due to a change in government (social-democrats and green party won the elections in 2014). The new government would like to shut down the oldest units within the next 3 years, but no decisions have been made yet.

The re-structuring of E.ON – majority owner of the Oskarshamn nuclear power plant – will most likely result in a change of owner-



ship of the facility. Also, very low energy prices in Sweden cannot motivate huge investments for the nuclear industry or for research other than maintenance of existing technology and safety upgrades. In February 2015 for example, the Swedish regulator SSM proposed new requirements for independent core cooling, which will result in more spending on modernisation for the existing units.

SKB, the company responsible for handling used nuclear materials, continues the plan for building a final repository for spent nuclear fuel. SSM is examining the application by SKB and is preparing to submit its final findings to the government by 2017. Furthermore, university education for nuclear engineering at Chalmers (Gothenburg), KTH (Royal Institute, Stockholm) and Uppsala University continue to struggle with recruiting students.

The latest public opinion report that could be found for Sweden was published in 2013. It looks at how the public opinion on different sources of electricity production has developed between 1999 and 2012. The part on nuclear energy involves on average 1,600 people and puts the question: "To what extent should Sweden develop the nuclear sector in the next 5 to 10 years?"

While in 1999 only 9 percent would like to see strong investments into nuclear, the number increased to 19 percent before Fukushima, only to decrease to 14 percent in 2012. On the other hand, the number of people opposing nuclear energy decreased from 49 percent in 2000 to 41 percent in 2010 but increased to 48 percent in 2012. It can be said that the public opinion is equally divided on the question of nuclear energy.

2016

International Youth Nuclear Congress



IYNC2016 will be held in Hangzhou, China and will bring together more than 700 young and senior professionals, students and academia. During one week, IYNC2016 will feature plenary sessions, interactive workshops, technical tracks, a large variety of technical tours and networking activities. In the spirit of a volunteer organization, we are seeking corporate and organizational sponsors and exhibitors who believe in the future of the nuclear industry and in the potential of the next generation.



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Co-Hosted by the Chinese Nuclear Society
Young Generation Network