In 2016 the global nuclear industry continued the steady progress recorded in 2015, with ten new units (totalling 9579 MWe) connected to the grid. Five of these new connections were in China with one each in Russia, Pakistan, India, South Korea and the USA. The dominance of Asian countries and especially China in new nuclear construction evidently remains an important trend.

For the second year running, the industry was on the right path for achieving the Harmony goal of 1000 GWe of new nuclear added to reach 25% of global electricity by 2050. There will be years with fewer units connected than others, but over the next five years we expect to maintain our momentum. However, beyond this time frame the rate needs to expand greatly. Getting more nuclear new build projects under way remains a global industry priority.

The World Nuclear Association works towards this priority through the Harmony programme. This has entered a new stage with the establishment of three work areas: achieving a level playing field in global electricity markets, harmonizing international regulatory processes, and developing a more effective safety paradigm.

The Harmony programme is integrated with our existing industry cooperation, nuclear information and communication activities – all of which saw steady improvement in 2016. A special mention goes to the Regional Workshops led by the CORDEL Working Group and Long Term Operation Task Force, designed to solicit information on the main technical and regulatory issues facing nuclear power plants, which took place in Chicago, USA, and Moscow, Russia. The World Nuclear University continues to provide a unique opportunity for future industry leaders. The 2016 Summer Institute was held in Canada and the University also organised four short courses in Malaysia, South Korea, China and Romania.

In terms of new initiatives, our first World Nuclear Performance Report made an important impact. This report series targeted at industry and international organizations provides an up-to-date factual picture of the nuclear power sector today. We also launched the Nuclear Footprints advocacy campaign, a collection of five short animations which describe nuclear energy in terms of everyday issues people care about – such as the environment, public health and the future.

The entering into force of the Paris climate agreement in 2016 was a major milestone in the battle to limit the extent of climate change. Electricity consumption remains on track to double by 2050 and nuclear energy must greatly expand if we are to meet the need for reliable low-carbon generation.

Towards this end the Association will continue to develop the Harmony programme so that governments and industry around the world can remove the barriers to nuclear energy’s growth. Progress is being made on the issue papers on each of the Harmony objectives and, with the involvement of expert groups and key stakeholders, we are aiming to have these ready by the end of 2017.

We will continue to participate actively in high-level meetings, including international energy, environment and sustainability events, to put nuclear energy on the agenda. In a welcome development the three-yearly conference of the Multinational Design and Evaluation Programme, which brings international regulators and industry experts together to exchange knowledge on reactor design licensing, will be held alongside our annual Symposium in London, UK in September. We have also been invited to present the Harmony programme at the IAEA ministerial conference in October in Abu Dhabi, UAE, which takes place every four years.

On the communications front, our online information resources will receive a makeover as our Nuclear Basics pages are refreshed. We are also very proud to be celebrating World Nuclear News’ 10th anniversary this year. We will also be publishing new editions of our flagship Nuclear Fuel Report and the World Nuclear Performance Report, which was launched last year. The World Nuclear University will hold the Summer Institute in Sweden, the Radiation Technology School in Brazil, and short courses in various countries.

In 2017 the World Nuclear Association remains committed and more focused than ever in serving our members’ needs and representing the interests of the global nuclear industry.

Agneta Rising
Director General

Helmut Engelbrecht
Chairman
Harmony is the global nuclear industry’s vision for the future of electricity. To meet the growing demand for reliable, affordable and clean electricity, we will need all energy sources to work together as part of a balanced mix. Achieving this means nuclear energy capacity must triple globally by 2050. The nuclear community needs to meet this challenge, addressing its key stakeholders so that barriers to growth can be removed.

**Goal**

Nuclear electricity to supply 25% of global electricity by 2050

**Objectives**

- Level playing field
- Harmonized regulatory processes
- Effective safety paradigm

**Why we need Harmony**

Access to electricity and the need for clean air are vital. Electricity consumption continues to rise but air pollution and greenhouse gas emissions must fall.

The Harmony programme is based on the International Energy Agency’s 2 degrees scenario, which sets out a pathway that avoids the most damaging consequences of climate change and requires a large increase of all low-carbon sources, of which nuclear energy is an important part.

An increased share of low-carbon sources, as well as a greatly reduced level of fossil fuel, work together in harmony to ensure a reliable, affordable and clean future energy supply.
The challenges

There are currently several barriers standing in the way of achieving the Harmony goal. Most electricity markets do not recognize the full costs of different forms of electricity generation. Even when carbon pricing is included, it does not represent the true long-term cost of greenhouse gas emissions. There are also significant system costs associated with unpredictable and variable renewable generation which aren’t reflected in market price, and reliable and dispatchable energy, such as nuclear energy, is not valued by many liberalized markets.

Nuclear regulation is fundamental to safe operation, but regulatory hurdles for nuclear energy can also lead to over-engineering and cumbersome processes that may use time and resources without adding additional functionality, placing an unnecessary burden on nuclear operators. The current energy system lacks a holistic safety approach. It fails to consider safety from a global society perspective and in terms of genuinely improving people’s health and the environment.

The key to success

The global nuclear industry needs to focus on removing those barriers to the growth of nuclear energy. Three objectives are key to achieving the Harmony goal:

- Establish a level playing field for all low-carbon technologies, valuing not only environmental qualities, but also reliability and grid system costs.
- Ensure harmonized regulatory processes, leading to enhanced standardizations, updated global codes and standards, and the timely licensing of new technologies.
- Create an effective safety paradigm that increases genuine public wellbeing by reducing emissions, ensuring high safety standards are met, and securing confidence in the management of nuclear technology and operations.

Required rate of nuclear new build to meet Harmony goal:

A roadmap of the build rate required to meet the Harmony goal of 1000 GWe of new nuclear capacity by 2050 is:

- 10 GWe per year between 2016 and 2020
- 25 GWe per year between 2021 and 2025
- 33 GWe per year between 2026 and 2050

This is an ambitious programme, but the rate at which new reactors will have to be built is no higher than what has been historically achieved. Today, with the experience and knowledge we’ve gained, the nuclear energy industry is in a strong position to deliver on the Harmony goal.
Introducing World Nuclear Association

World Nuclear Association represents the global nuclear energy industry.

Our mission

The Association’s mission is to promote a wider understanding of nuclear energy among key international influencers by producing authoritative information, developing common industry positions, and contributing to the energy debate.

Who we are

Our member companies are located on every continent in 36 countries. They represent all aspects of the global nuclear industry, including:

- All major reactor vendors.
- Nuclear utility companies responsible for 70% of the world’s nuclear energy production.
- Virtually all of the world’s uranium mining, conversion, enrichment and fuel fabrication companies.
- Major nuclear engineering, construction and waste management companies, as well as R&D organisations.
- Companies providing services to the nuclear industry in areas such as transport, law, insurance, and finance.

A global network of member companies
What we do

World Nuclear Association is the only industry organization with a global mandate to communicate about nuclear energy and represent the companies involved in the worldwide industry. We are in a unique position to share and advance best practices, work alongside other organizations across the globe, and provide unrivalled business opportunities for our members.

Nuclear Industry Cooperation

We provide an invaluable forum and commercial meeting place for our members, who are leaders and specialists in all aspects of the worldwide nuclear industry. Our members have the chance to shape positions on economic, safety, environmental and technical issues through our Working Groups. Furthermore, we represent the industry and our members in key world forums that can influence the nuclear industry’s regulatory and policy environment.

Nuclear Information Management

We pride ourselves on providing trustworthy, thoroughly-researched information on nuclear power via our website, which serves as the world’s most comprehensive nuclear information source, and through reports and publications. The information we provide is influential and widely used within the industry and in news services and government. Our World Nuclear News service is the leading online news provider on developments related to global nuclear power.

Nuclear Energy Communication

With a goal to increase global support for nuclear energy among key stakeholders and decision-makers, we identify important energy debates and strategically represent nuclear energy’s interests. By coordinating with our partners on key messages, we deliver targeted information to decision-makers and influencers, including media and international organizations.

Nuclear Training

Through the World Nuclear University programmes, we work with the International Atomic Energy Agency, the OECD Nuclear Energy Agency, and the World Association of Nuclear Operators to enhance nuclear education and build nuclear leadership to secure the future of the industry.
### January 2016

**Nuclear Power Asia**
Agneta Rising gives a keynote address at Nuclear Power Asia 2016, emphasizing the potential of nuclear energy in the region.

**WNU Advisory Panel**

**Working Groups**
120 delegates attend January’s working group meetings in London, UK.

### February

**Website relaunch**
The Association’s website relaunches with a new mobile-optimized design. It also includes a new easy-to-use and fully searchable reactor database.

**Paks consultation**
The Association responds to the consultation exercise initiated by the European Commission in connection with its competition investigation into the construction of the Paks II nuclear power plant in Hungary.

### March

**Nuclear Footprints**
The Association’s advocacy campaign, Nuclear Footprints, is released. Its mission is to advocate on the benefits of nuclear energy to society.

**Nuclear Industry Summit**
Helmut Engelbrecht and Association staff attend Nuclear Industry Summit and Expo in Washington DC, USA contributing to the working groups.

### April

**World Nuclear Fuel Cycle 2016**
World Nuclear Association and Nuclear Energy Institute jointly organize the World Nuclear Fuel Cycle, taking place in Abu Dhabi, UAE.

**WNU Alumni Assembly**
Workshop for WNU alumni takes place in Beijing, China, hosted by China Nuclear Energy Industry Corporation.

**Board Meeting**
The World Nuclear Association Board officially approves the Harmony programme strategy, and welcomes new chair Helmut Engelbrecht.

### May

**WNU Short Course**
WNU short course ‘The World Nuclear Industry Today’ takes place in Penang, Malaysia.

**International Framework for Nuclear Energy Cooperation (IFNEC)**
Agneta Rising presents an industry perspective to the Nuclear Finance Conference in Paris, France organized by IFNEC and the Nuclear Energy Agency.

### June

**AtomExpo**
The Association takes a leading role at AtomExpo International Forum in Moscow, Russia advocating on Harmony goals to an audience of international professionals.

**Performance Report**
The Association publishes the World Nuclear Performance Report 2016. It provides key metrics on nuclear power plant performance, and reviews recent developments in the global industry.

**Regional Workshop series**
The first in a series of regional workshops led by CORDEL and the LTO Task Force takes place in Chicago, USA in collaboration with Exelon Generation.
July

**WNU Summer Institute**
The WNU holds its 12th Summer Institute in Ottawa, Canada, with 71 fellows from 31 countries in attendance.

September

**Working Groups**
300 members attend September’s working group meetings, taking place in London, UK before the Symposium.

**Symposium 2016**
The Association’s Symposium attracts 600 delegates from 33 countries. The programme is opened by Agneta Rising, who updates the industry on its Harmony goals.

**WNU Olympiad**
The WNU Nuclear Olympiad award is presented at the Symposium to Team Amity from India.

The World Nuclear Supply Chain: Outlook 2035
The biennial report is published, providing a market-oriented review of the challenges and opportunities for nuclear power plants and their supply chain, including scenarios for the evolution of nuclear power over the next two decades.

October

**IAEA General Conference**
The Association attends the IAEA General Conference in Vienna, Austria. Agneta Rising speaks at the Scientific Forum where she emphasizes nuclear’s importance in reaching the UN’s sustainable development goals.

**Science and Technology in Society Forum**
Agneta Rising attends the STS Forum in Kyoto, Japan as a lead speaker at the ‘Nuclear Technology Prospects’ roundtable.

November

**COP 22**
The Association attends COP 22 in Marrakech, Morocco. Agneta Rising speaks at a press conference with Rosatom, setting out nuclear energy’s contribution in mitigating climate change.

**Asian Infrastructure Investment Bank submission**
Responding to the bank leaving out nuclear energy in its infrastructure draft, the Association stresses the desire for nuclear in the region and the importance of financing options to meet it.

**Women in Nuclear Conference**
Agneta Rising speaks at the WiN Conference in Abu Dhabi, UAE on the importance of gender equality in the industry.

**WNU Short Course**
The WNU short course is held in Bucharest, Romania, titled ‘Overview and Key Topics in the World Nuclear Industry’.

December

**Harmony workshop**
The Association’s staff attend a workshop to develop each of Harmony’s three core objectives.
A Global Network of Members

Membership of the World Nuclear Association is open to all companies involved in nuclear energy: generators, suppliers, uranium producers, fuel cycle and other nuclear supply chain companies. The Association also welcomes members from related and supporting organizations, including banks and financial institutions, law firms, government and research agencies.

New members in 2016

<table>
<thead>
<tr>
<th>Country</th>
<th>Company Name</th>
</tr>
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<tbody>
<tr>
<td>Brazil</td>
<td>ABDAN (Brazilian Association for Development of Nuclear Activities)</td>
</tr>
<tr>
<td>Australia</td>
<td>Bannerman Resources</td>
</tr>
<tr>
<td>Indonesia</td>
<td>BATAN (National Nuclear Energy Agency)</td>
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<tr>
<td>UK</td>
<td>Berkeley Energia</td>
</tr>
<tr>
<td>USA</td>
<td>Fugro GeoServices Ltd.</td>
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<tr>
<td>USA</td>
<td>Lightbridge Corporation</td>
</tr>
<tr>
<td>USA</td>
<td>NKENT Consulting LLC</td>
</tr>
<tr>
<td>UK</td>
<td>NuGeneration Ltd.</td>
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<tr>
<td>USA</td>
<td>NuScale Power</td>
</tr>
<tr>
<td>UK</td>
<td>Numerco Ltd.</td>
</tr>
<tr>
<td>USA</td>
<td>NYNCO (New York Nuclear Corporation)</td>
</tr>
<tr>
<td>India</td>
<td>Rencel Energy &amp; Metal Ltd.</td>
</tr>
<tr>
<td>Netherlands</td>
<td>Wallich &amp; Matthes B.V.</td>
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</table>

All members must agree to the Association’s Charter of Ethics upon joining. The Charter is an affirmation of values and principles, underlining the responsibilities of the global nuclear industry and the legal and institutional frameworks it must operate within.

High member satisfaction

We welcome feedback from our members. This year’s opinion survey provided us with an opportunity to hear members’ thoughts and suggestions for future improvement. In 2016, 82% of members were very satisfied or satisfied with membership – our highest result yet.

The top four purposes of World Nuclear Association membership

1. To have an opportunity for international networking.
2. To support the Association’s role in promoting nuclear energy internationally.
3. To participate in Working Groups.
4. To access information through the members website and newsletter.
Benefits of joining the Association

World Nuclear Association influences the global energy debate and opens up business opportunities for your company.

We support the nuclear industry

We promote nuclear energy by engaging with key global stakeholders on topics of strategic importance to nuclear development.

We represent the global nuclear industry in key international forums.

We provide the latest and most reliable nuclear information, including the public Information Library on our website and World Nuclear News, the daily news service.

We develop industry positions and reports on the issues that matter through our Working Groups.

We open up opportunities for your company

We offer you unique opportunities to interact and network with experts, industry leaders, customers and suppliers.

We support your capacity building and nuclear skills development through the World Nuclear University.

We give you privileged online access to industry reports, presentations and contact directories, and free printed copies of the biennial Nuclear Fuel Report and The World Nuclear Supply Chain report.

We support your capacity building and nuclear skills development through the World Nuclear University.

We collaborate with you and national associations to make smart and effective contributions to national dialogue.

We offer you heavily discounted rates to our conferences and opportunities to exhibit or sponsor to increase your company’s visibility.

Member demographic

- **56%** General (legal, transport, insurance, etc.)
- **23%** Generators (operators)
- **21%** Suppliers (vendors, engineering, construction, mining, enrichment, conversion, fuel fabrication, etc.)
Governance and Organization

The Director General is responsible for the running of the Association and is ultimately accountable to the Board of Management. The Board holds final approval on proposals made by the Director General, including strategic and budgetary decisions.

In 2016, Helmut Engelbrecht from Urenco became Chairman, and Jean-Jacques Gautrot from AREVA became Vice-Chairman.

The Board of Management

The Board is composed of senior executives from member companies who meet twice a year and serve for two years. The Chairman of the Board is also appointed for a two-year term, after serving as Vice-Chairman in the preceding year.

The Board fulfils all statutory duties pertaining to the organization’s governance, and sets policies and strategic objectives acting on proposals from the Director General.

To ensure balance among the elected members of the Board, each of the three categories of institutional membership – suppliers, generators, and general – must be represented by at least two members.

Board members act as mentors for the various Members Groups. This enables the Board to monitor the activities of the groups and to shape their overall agenda.

Membership meetings

There are two annual meetings where the whole membership is called and can vote, as well as ask questions to the Chairman and Director General about the operations of the Association. At the Annual General Meeting, the accounts are presented for approval and any fee changes or alterations to the fee structure are put to vote. Immediately after the AGM, the Members Council takes place, during which significant developments in the Association are presented to the member company representatives in attendance.

In 2016, the Board met on 4 April and 14 September in Abu Dhabi and London respectively.

There are also two Board sub-committees, whose members serve two-year terms and report directly to the Chairman of the Board:

- The Governance and Nominations sub-committee oversees appointments to the Board and handles Director General and senior staff succession planning.
- The Audit and Finance sub-committee carries out a regular review of the financial health of the Association, and assesses and holds in-depth dialogue with the auditor during the preparation of the annual accounts.

Audit

In 2016, the Board carried out an independent review. The external auditor Moore Stephens LLP was re-appointed.

The 2015 accounts were signed by the World Nuclear Association Board of Management on 4 April 2016, having been prepared in accordance with the applicable accounting standards and given a clean bill of health by the external auditor.

The financial statements were then presented at the Annual General Meeting held on 14 September 2016.
### Board members

**As of February 2017**

<table>
<thead>
<tr>
<th>Chairman</th>
<th>Vice-Chairman</th>
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<tr>
<td>[Image of Helmut Engelbrecht]</td>
<td>[Image of Jean-Jacques Gautrot]</td>
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<td>[Image of Clark Beyer]</td>
<td>[Image of Kuan-sung Lee]</td>
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<td>[Image of Tim Gitzel]</td>
<td>[Image of Leon dos Santos Guimarães]</td>
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<td>[Image of Helmut Engelbrecht]</td>
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<td>[Image of Jonathan Isted]</td>
<td>[Image of Peter Prozesky]</td>
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<td>[Image of Krell Komarov]</td>
<td>[Image of Denis Lépée]</td>
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<td>[Image of Michael Pacilio]</td>
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<td>[Image of Tim Gitzel]</td>
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<th>Honorary</th>
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<td>[Image of Hans Blix]</td>
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<td>[Image of Gerald Gransee]</td>
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<td>[Image of Peter Prozesky]</td>
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The Secretariat

The World Nuclear Association is made up of an international Secretariat of 35 people, covering a broad range of expertise and experience.

The Secretariat is led by Agneta Rising, the Director General, and consists of five departments each headed up by a manager. Most of the Secretariat work from the Association’s offices in London, UK, and representatives are also based in India, China and Australia.
In 2016, the Association continued to focus on strengthening its relations with existing partners and building new ones with influential stakeholders in the energy sector. We expanded our outreach communication through online campaigns, enhancing our social media activities, and increasing our participation in pan-energy events. We will strengthen these activities in 2017, focusing on building awareness of Harmony and the progress industry is making.

Influencing the Energy Debate

Representing the nuclear industry

The Association represents the industry in key forums where the future of energy is being discussed. Speaking at these high-level events provides an opportunity to place nuclear energy on the agenda and underline its important contribution to the future energy system.

In 2016, the Association participated in:

- The World Energy Congress in Istanbul, Turkey, where Agneta Rising emphasized the industry’s three core Harmony objectives to a broad audience of decision-makers.
- Singapore International Energy Week, where we launched the Asia edition of our World Nuclear Performance Report.
- COP 22 in Marrakech, Morocco where Agneta Rising spoke at a press conference with Rosatom, setting out nuclear energy’s contribution in mitigating climate change.

Providing expert opinion

The Association regularly contributes to stakeholder and engagement exercises conducted by international organizations. In 2016 we responded to the consultation exercise for setting up the energy policy of the newly-formed Asian Infrastructure Investment Bank. We also made a submission to the European Commission inquiry into whether the Paks II project constituted state aid. Later in the year, the Association contributed as joint lead author to the nuclear and uranium chapter of the World Energy Council’s World Energy Resources Report published in September 2016.

Advocating nuclear energy

The Nuclear Footprints campaign (www.nuclearfootprints.org) was launched in March 2016 and aims to convey the benefits of nuclear energy to a wider audience, framing nuclear technology in terms of issues that people care about. We worked with industry communication experts to create content which engages on an emotional and visual level, and released five animated videos over the course of 2016 and early 2017. The campaign has reached tens of thousands of people and over 1,000 people signed our declaration in support of nuclear energy so far.
Influencing via social media

The Association recognizes the potential social media has to influence change, and has been using it as a strategic tool to inform the worldwide energy debate. In 2016, we ramped up our social media efforts to include a greater variety of topics and formats, and implemented analytic reporting to better understand what our global audience responds to. Our social streams reflected updates on strategically-important regions, posted at times to maximize engagement. Overall, these efforts helped us to increase website traffic generated from social sources by 25% in 2016, and we aim to further capitalize on this in the year ahead.

Strengthening nuclear’s place in the media

A specific strategy for press engagement in 2016 was to draw attention to the conclusions regarding future nuclear energy use contained within the International Energy Agency’s Energy Technology Perspectives and World Energy Outlook reports.

Throughout the year, we issued press statements on important events for nuclear energy, such as the Swiss nuclear referendum result, the ratification of the Paris Agreement on climate change, COP 22 in Marrakech, and approval for the Hinkley Point C project in the UK.

Our staff featured in audio and video interviews, including CCTV News (China), TRT (Turkey) and France 24, and we also produced articles for publications such as the World Energy Council’s World Energy Focus and Nuclear Engineering International magazine.

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Providing Expert Information

Our website, with its Information Library, serves as the premier nuclear information resource, while World Nuclear News (WNN) has established itself as the leading news service on developments related to nuclear energy. They are indispensable tools for industry, government, media, and academia. These key services means the Association is well-informed of the industry and its context around the world, helping it to provide knowledge to its members and further the Harmony programme.

WNN celebrates 10th anniversary

In 2017, World Nuclear News (WNN) celebrates its 10th anniversary.

The mission of WNN has always been to provide free and accurate public information on nuclear energy. Doing this through in-house journalism was a new concept in 2007 which has since been taken up by others in and around our industry. We are proud that our formula has remained successful and has evolved over a decade as new technologies and social media channels have come to the fore.

Today, the availability of well-researched, relevant and trustworthy information is more important than ever. The WNN team is proud of its role in supporting an improved understanding of the industry and is excited to further strengthen its position in the online information landscape.

www.world-nuclear-news.org
World Nuclear Association website

Website usage continues to grow, with 5.1 million visits to the site and 7.5 million page views in 2016. This means on average the website received 19,500 visits each working day. In response to a growing share of traffic generated from mobiles, in February 2016 we relaunched our website with a new responsive design, which adapts to suit the mobile device our users are visiting the website from.

Information Library

The library section of the website features 185 detailed pages covering every aspect of the nuclear industry including current projects, future prospects, technology, policy issues and country-by-country briefings. All of these are constantly maintained and updated an average of 21 times per week. These pages were viewed a total of 6.4 million times in 2016.

Reactor Database

With main data, key dates, maps and performance information on every reactor in the world, the Reactor Database combines the Association’s in-house research with official IAEA data to provide a searchable resource on the global nuclear fleet and its performance.

World Nuclear Performance Report

The first World Nuclear Performance Report was published to provide an up-to-date picture of the civil nuclear power sector and its performance across key metrics. The report was well received and articles summarizing its conclusions were featured in international media, and several national nuclear organizations such as the Société Française d’Énergie Nucléaire (SFEN) and the German Atomic Forum. The Asia Special Update edition of the report, which included a focus on reactor performance in the region, was published alongside Singapore International Energy Week in October 2016.

Publications

The Association publishes reports on industry topics and Working Group-related activities. The latest publications include:

- Nuclear Power Economics and Project Structuring 2017
- World Nuclear Performance Report 2016
- World Nuclear Performance Report 2016 – Asia Special Update
- The World Nuclear Supply Chain – Outlook 2035
- WNU Nuclear Olympiad Report
- Vendor Oversight and Quality Control in the Nuclear Industry
Business and Networking Opportunities

World Nuclear Association provides a global forum and commercial meeting place for its industry members. We run our own events around the world, as well as co-host, support, and partner with other important conferences.

World Nuclear Association Symposium

The Association’s Symposium, taking place every September in London, is attended by hundreds of top nuclear energy professionals and executives from all over the world. A two-day conference on important nuclear energy issues is held alongside Working Group meetings, and other opportunities for attendees to network.

In 2016, the Symposium began with an exclusive evening reception held in Inner Temple Gardens, sponsored by Korea Hydro & Nuclear Power. Agneta Rising opened the conference agenda, presenting an update on the progress the industry has been making in reaching its three core Harmony objectives. The programme featured expert presentations on nuclear power and the fuel cycle from leading figures in the nuclear industry, including Vincent de Rivaz (Chief Executive of EDF Energy) who gave a talk the day after EDF Energy’s Hinkley Point C was approved by the UK government.

A gala dinner, at London’s historic Guildhall, closed the conference, with a cultural experience sponsored by China National Nuclear Corporation.

Delegate positions in 2016

<table>
<thead>
<tr>
<th>Position</th>
<th>Percentage</th>
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<tbody>
<tr>
<td>CEOs, VPs and directors</td>
<td>58%</td>
</tr>
<tr>
<td>Senior managers and advisors</td>
<td>23%</td>
</tr>
<tr>
<td>Journalists</td>
<td>8%</td>
</tr>
<tr>
<td>Engineers and technical experts</td>
<td>7%</td>
</tr>
<tr>
<td>Officers</td>
<td>4%</td>
</tr>
</tbody>
</table>

Symposium 2016 statistics

- 33 Countries represented
- 597 Delegates
- 39 International speakers
- 22 Exhibitors
- 243 Companies
“The Symposium is an ideal opportunity to meet the whole of the industry in one room at one time. It brings together the leaders of the nuclear industry in one place.”
Alistair Evans, Head of Government Affairs, NuGeneration Ltd

“The Symposium is an excellent opportunity to hear from the very prestigious, very knowledgeable people across the industry.”
Yoichi Maeda, Senior Counsel, Mitsubishi Corporation Power Systems

World Nuclear Fuel Cycle

Every April, World Nuclear Association runs the World Nuclear Fuel Cycle (WNFC) conference jointly with the Nuclear Energy Institute. The conference provides an international forum to discuss issues affecting the nuclear fuel cycle, with leading industry experts attending to provide insights to help the industry navigate the complex fuel marketplace. WNFC also offers a technical tour alongside the conference. The conference takes place in a different location each year, enabling people from all continents to attend. WNFC 2016 was held in Abu Dhabi, UAE, and participants had the opportunity to visit the Barakah nuclear power plant.

In 2017, the conference will be held in Toronto, Canada on 25-27 April.

WNFC 2016 participation by region

- 30% Europe
- 29% Americas
- 23% Asia
- 9% Russia
- 7% Middle East and Africa
- 2% Australia
Members Group meetings

The Association organizes Members Group meetings throughout the year. These meetings are typically held in January, in April alongside the WNFC conference, and in September alongside the Symposium.

At the April meetings in Abu Dhabi, UAE almost 100 delegates participated in the Fuel Cycle Working Groups. Meetings in September 2016 and January 2017 were attended by 284 and 130 people respectively.

These meetings are combined with social events to maximize opportunities for business networking.

Regional Workshops series

In 2016, the Association launched a series of workshops – to take place in different locations around the world – in order to solicit information on the main technical and regulatory issues facing nuclear power plants. Led by CORDEL and the LTO Task Force, the series is directed at operators, vendors, and suppliers around the world, as well as national and regional stakeholders. The workshops took place in the USA and Russia in 2016. In 2017, the next in the series will be in Asia.

Meetings ahead

Conferences
25-27 April World Nuclear Fuel Cycle conference, Toronto, Canada
13-15 Sept World Nuclear Association Symposium, London, UK

Working Groups
15 March CORDEL Steering Committee, Bethesda, USA
19-21 April Radiological Protection Working Group, Tokyo, Japan
24-25 April Fuel Cycle and Cross-Cutting Working Groups, Toronto, Canada
11-13 Sept All Working Groups, London, UK
9 October Radiological Protection Working Group, Paris, France
World Nuclear Association provides many opportunities for its members to interact and collaborate. Working Groups are forums for industry cooperation on topics of common interest, and Advisory Groups are designed to support the Secretariat in identifying opportunities and challenges for the Association.

Each Group is chaired by an expert from a member company and has a mentor assigned to it from the Board. Administrative and technical support are provided by the Secretariat.

In 2016, Working Groups held throughout the year attracted over 500 attendees.
Fuel Cycle Working Groups

Fuel Report
Co-Chairs: Fletcher Newton (Tenam) and Fredrik Leijonhufvud (Vattenfall)
Staff Director: Ian Emsley

Published since the 1970s, The Nuclear Fuel Report: Global Scenarios for Demand and Supply Availability compiles data from companies, international agencies and other public sources to produce an authoritative projection of global nuclear fuel supply and demand. The Fuel Report Working Group is the forum through which member experts cooperate on the report. The Group is broken down into sub-groups, which focus on different areas of the fuel cycle and have ownership of different chapters.

In 2016 the Group started to work on the September 2017 edition of the report, which will cover 2017 to 2035. During three meetings in January, April and September, new possibilities for extending and recasting the report were discussed and agreed. An interim update of the nuclear capacity scenarios was published in September 2016, while the Utilities Questionnaire was sent later in the year, with the results used to update the planned capacity changes in the Uranium Requirements Model. 2016 also saw a survey undertaken of member attitudes towards security of fuel supply, which was reported on at the September meeting.

In 2017 the Group will gather further information via the Inventories and Producer Questionnaires and continue to update data based on new public information. The final report will be presented at the Association’s Symposium in September.
The mission of this Group is to monitor developments and shape industry positions with a view to engaging in the international debate on sustainable management strategies for the back end of the fuel cycle. The Group also acts as a forum for experts to share good practices in used fuel management. In 2016, the Group contributed to the review of the first IAEA Status and Trends in Spent Fuel and Radioactive Waste Management Report, and was invited to join the Steering Committee for future editions of the report.

The Group also successfully conducted a pilot survey of the members focusing on used fuel management strategy, technical issues, as well as financial and communication aspects. In 2017, the group intends to roll out the survey to all other nuclear utilities.

The mission of this Group is to:
- Assemble the practical expertise of the industry and stakeholders (including newcomers) to formulate an industry viewpoint on security policy and systems.
- Support and guide the Association’s engagement with the IAEA and other agencies in the fields of security and non-proliferation to ensure that the industry’s analysis contributes effectively to the consideration of future policy options. The Group is represented on the Nuclear Security Guidance Committee (NSGC), responsible for developing IAEA recommendations on security.
- Foster cooperation amongst member companies on cyber security issues.
- Promote a reliable and proliferation-resistant international fuel cycle and act as a reference point for potential newcomers.

Sessions consist of formal presentations and panel discussions, as well as reports from Working Groups in the fuel cycle area.
CORDEL’s mission is to promote a worldwide nuclear regulatory environment where internationally accepted standardized reactor designs can be widely deployed without major design changes at the national level. In practice, this would mean that generic design certification and safety evaluations approved by a recognized competent authority in the country of origin would be acceptable in other countries.

CORDEL acts as the industry’s voice in the area of reactor design standardization with the Multinational Design Evaluation Programme (MDEP), International Atomic Energy Agency (IAEA), European Nuclear Installations Safety Standards Initiative (ENISS), European Utility Requirements for LWR Power Plants (EUR), International Electrotechnical Commission (IEC), and the SDO Convergence Board.

In 2016, CORDEL and the Long Term Operation Task Force launched a consultation and outreach initiative designed to solicit information on the main technical and regulatory issues facing nuclear power plants – both operating and new-build. Two regional workshops were held, the first hosted by Exelon in June 2016 in Chicago, USA; the second in cooperation with Rosatom in October 2016 in Moscow, Russia. The next workshop will be held in 2017 in Asia.

The key successes of the various CORDEL Task Forces in 2016, as well as further tasks to be undertaken, include:

- The Mechanical Codes and Standards Task Force played a key role in drafting an international comparison of welding and welder qualification requirements, which was published by ASME as a report in early 2016. The Task Force has launched its benchmark on non-linear analysis methods, with results expected in 2017. The Task Force has also initiated a new project on the comparison of code requirements for fatigue analysis.

- The Design Change Management Task Force finalized its design authority report. The main messages of the report have been presented at two IAEA conferences (International Conference on Effective Nuclear Regulatory Systems, April 2016, and International Conference on Nuclear Knowledge Management, November 2016).

- The Licensing and Permitting Task Force, a joint initiative with the Law Working Group, has initiated work on the concept of a reference plant and on the licensing processes for decommissioning. The members of this group also support the other CORDEL Task Forces, for example the SMR Task Force, on licensing issues.

- The IAEA Nuclear Safety Standards Task Force continues to monitor the work being performed by the IAEA Nuclear Safety Standards Committee (NUSSC) providing industry input where required.

- The Digital Instrumentation & Control Task Force has established a formal liaison with the International Electrotechnical Commission. Work continues in the area of safety classification of instrumentation and control (I&C) systems, defence in-depth and the modernization of I&C systems in existing plants. Several reports are in preparation.

- The Small Modular Reactors Task Force advocates applying the CORDEL model to global SMR deployment with its vision laid out in a 2015 report, Facilitating International Licensing of Small Modular Reactors. Current work is focused on the areas of in-factory certification, infrastructure for emerging nuclear countries, and export control.
Supply Chain

Chair: TBC   Staff Director: Greg Kaser

The Supply Chain Working Group supports members in monitoring and identifying market trends, identifying techniques for timely and efficient plant construction, and communicating with stakeholders on industrial developments. The Group has represented the industry at the Vendor Inspection Coordination Working Group (VICWG) of the Multinational Design Evaluation Programme (MDEP).

A third edition of *The World Nuclear Supply Chain Outlook* was published in August 2016. The report included a special section on exporting nuclear technology. The Group also published a report on vendor oversight and quality control in the nuclear industry in December 2016. A presentation on the risk of counterfeit, fraudulent and suspect items was made to the VICWG in December 2016.

The New Build Lesson-learning Task Force, which was established in September 2015 under the Group, will issue its findings and discuss these with key stakeholders, including the power and finance sectors, in the first half of 2017.

Capacity Optimization

Chair: Mike Baron (Global Nuclear Associates)   Staff Director: Henri Pelin

The Capacity Optimization Working Group identifies means by which nuclear power plant operators worldwide can improve the performance of their plants. The Group focuses on areas relevant to plant economics such as availability, reliability, flexibility and capacity. In 2015, the Group created a Long Term Operation (LTO) Task Force as a forum for: sharing and comparing experience on the LTO licensing processes for different countries; addressing the challenges relating to engineering and asset management; and defining best practice. In 2016, the LTO Task Force teamed up with CORDEL to hold the first two regional workshops of a series designed to solicit information on the main technical and regulatory issues facing nuclear power plants. The first workshop was held in June 2016 in Chicago, USA hosted by Exelon, and the second in October in Moscow, in cooperation with Rosatom. A meeting held in September focused on LTO services offered by vendors to operators. In 2017, the Task Force will coordinate the next regional workshop to be held in Asia, and cooperate in the IAEA’s 4th International Conference on Nuclear Power Plant Life Management to be held in Lyon, France.

In 2017 the Group also plans to revisit the 2015 report on nuclear export controls and contribute to the development of a standard for internal compliance programmes through the Botticelli Project.

Waste Management & Decommissioning

Chair: Mike Pieraccini (EDF)   Staff Director: Binika Shah

This Group monitors developments in the international system of waste management and decommissioning and helps to shape industry positions. It advocates the appropriate re-use and recycling of material – and safe disposal of wastes – from nuclear sites. The Group represents industry interests on the IAEA Waste Safety Standards Committee (WASSC) and Radioactive Waste Technical Committee (WATEC).

Over 2016, a sub-group of members worked on a methodological guide for managing waste from decommissioning, the scope of which covers the strategic, technical and economic aspects of waste management. The guide is expected to be finalized in 2017. The Group will remain a forum for companies with experience of waste management and decommissioning to share their knowledge and experience with those new to the field or planning for the future. In 2017, the Group will continue to cooperate with other Working Groups on topics such as sharing practical lessons learned on the radiological protection of workers during decommissioning, preparing for the end of licence, and the economics of managing waste and decommissioning.
This Group’s focus is on developing a better understanding of economics and the capital costs of new nuclear plants in particular. The Group also takes a close interest in the competitiveness of nuclear energy in the overall generating mix.

In 2016, the Group updated its Nuclear Power Economics and Project Structuring report, the findings of which will support the Association’s outreach in 2017. Data was also gathered on nuclear employment and presented to the Group.

Over the course of 2017, the Group will contribute to the NEA’s review of the way levelized costs of electricity are calculated to include the value of dispatchable power. It will also support the Long Term Operation Task Force and the Waste Management and Decommissioning Working Group on the economics of major refurbishment projects and decommissioning costs.
Advisory Groups

Advisory Panel

Chair: Tim Gitzel (Cameco)  Deputy Chair: Clark Beyer (Rio Tinto)  Staff Director: Virginie Ryan-Taux

The Advisory Panel has a consultative function. It seeks to identify challenges facing the global nuclear industry, opportunities to advance its position in policy arenas, and ways to improve the public acceptance of nuclear energy. It provides recommendations on how the World Nuclear Association should position itself in addressing these challenges.

The Panel’s focus in 2016 was to support the Secretariat in the development of the Harmony programme by participating in two consultative sessions in January and September, and providing comments to the issue papers of the three Harmony objectives. Other input from the Panel included the Association’s positioning in the COP 22 climate change conference in Marrakech, Morocco and feedback on the Association’s first World Nuclear Performance Report.

Communication Group

Chair: Jayne Hallett (Urenco)  Deputy Chair: Adrian Bull (National Nuclear Laboratory)  Staff Director: Virginie Ryan-Taux

The role of the Communication Group is to support the Association by identifying communication opportunities and challenges facing the industry and ways to address them. Its members also provide support to specific projects decided by the Group and help disseminate key messages to the wider industry and beyond.

In 2016, the Group reviewed the messages, scope and reach of Hot Topics, the Association’s booklet of key messages on nuclear issues, in view of publishing a 2017 edition.

The Group also worked on Nuclear Footprints, a proactive advocacy campaign on the theme of nuclear technology and how it relates to the environment, health and the future. The campaign was launched in March 2016, with five animated videos being released over the course of 2016 and early 2017.

In 2017, the Communication Group will provide support to the Secretariat on delivering the communication messages to support the Harmony goal, work towards developing a public acceptance initiative in emerging nuclear countries, and assist in refreshing the Nuclear Basics section on the Association’s website.
The internationally recognized World Nuclear University (WNU) programmes provide a stimulating multicultural and dynamic learning experience with up-to-date content, opening a gateway to global networking for nuclear professionals.

World Nuclear University

www.world-nuclear-university.org

“With over 40 years of experience in the nuclear industry, I have seen many organizational and individual development programs but what the WNU has done for the nuclear industry is far beyond the expectation and I want to personally thank you.”

Amir Shahkarami, President & CEO CASe Global Partners, Inc, former CEO, Exelon Nuclear Partners

Nuclear Olympiad

The WNU Nuclear Olympiad is an international nuclear communications challenge for undergraduate and graduate students who are passionate about nuclear science and technology. The 2016 challenge required students to propose three effective messages to communicate the need to expand nuclear capacity in order to hold global warming below 2 degrees to decision-makers. Team Amity won the challenge, represented by team leader Dhruv Dharamshi and his professor Dr. Amar Nath Garg from Amity University in India.

Short courses

Each year, the WNU offers courses designed for national educational and research centres, local nuclear industry, supply chain companies, and regulatory authorities. Taught by international experts, each course is adapted to the phase of nuclear development of the host country with the objective of offering practical knowledge, a global perspective of the industry today, and an exciting vision of the future.

In 2016, courses were held in Penang, Malaysia (30 May-3 June), Fuzhou, China (6-8 July), Seoul, South Korea (11-13 July) and Bucharest, Romania (14-17 November).
Summer Institute

The World Nuclear University Summer Institute 2016 took place in Ottawa, Canada from 28 June to 5 August. The Canadian Nuclear Safety Commission provided local support offering five interns and its public hearing rooms for the communications module. The Summer Institute programme aims at developing a broad understanding of nuclear topics and essential skills for effective leadership, and includes:

- Global energy setting
- Nuclear industry and applications
- Communication, project management and leadership
- Safety, security and safeguards

In 2016, key invited leaders included Helmut Engelbrecht (Chairman, World Nuclear Association), William Magwood (DG, OECD-NEA), Naohiro Masuda (CDO, TEPCO) and Peter Prozesky (CEO, WANO). The fellows visited nuclear installations from Cameco, Ontario Power Generation, Canadian Nuclear Laboratories and emergency preparedness facilities from Health Canada.

“It is an experience of a lifetime. The opportunity to learn and meet giants in the industry is amazing. It is a special experience that I would recommend to anyone in the industry.”

Shaun Kraut, Department of Energy, South Africa, Summer Institute Alumnus 2016

Network for Nuclear Innovation

An initiative derived from the Summer Institute is the Network for Nuclear Innovation. Fellows get together to discuss important current nuclear industry challenges and to produce an original piece of work. An article from one network was published in Nuclear Engineering International magazine, October 2016 edition.

Summer Institute Alumni Network

The Summer Institute training is continued with alumni workshops. In 2016 this programme took place in Beijing, China from 18-22 April, hosted by China Nuclear Energy Industry Corporation.

2016 Survey to Employers

With the objective of continuously improving the Summer Institute programme, a survey was sent to employers from industry, regulatory bodies, research institutions and professional associations who regularly send fellows.

<table>
<thead>
<tr>
<th>Top reasons for sending participants</th>
<th>Benefits noted upon return</th>
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<tbody>
<tr>
<td>Leadership development</td>
<td>Increased motivation</td>
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<tr>
<td>Global perspective on current nuclear topics</td>
<td>Improved communication skills</td>
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<tr>
<td>Extensive and international networking</td>
<td>Demonstrated “innovative and strategic thinking”</td>
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Events ahead

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<tr>
<th>Date</th>
<th>Event</th>
<th>Location</th>
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<tr>
<td>3-6 April</td>
<td>Short Course, Rio de Janeiro and São Paulo, Brazil</td>
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<td>12-15 June</td>
<td>Short Course, Astana, Kazakhstan</td>
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<td>27 June-4 August</td>
<td>Summer Institute, Uppsala, Sweden</td>
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<td>2-6 July</td>
<td>Short Course, Weihai, China</td>
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<td>5-7 July</td>
<td>Short Course, Daejeon, South Korea</td>
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<td>9-12 October</td>
<td>Short Course, Yogyakarta, Indonesia</td>
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<td>16-27 October</td>
<td>Radiation Technologies School, São Paulo, Brazil</td>
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<td>World Nuclear Association Members</td>
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<th>EDF</th>
<th>JSC Rusatom Service</th>
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<td>EURATOM Supply Agency</td>
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PricewaterhouseCoopers LLP
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Rio Tinto Uranium
Risk Engineering Ltd.
Rolls-Royce plc.
ROSATOM State Atomic Energy Corporation
Rosenergoatom Concern
RSB LOGISTIC Projektspedition GmbH
Shearman & Sterling LLP
Shikoku Electric Power Co Inc.
Shimizu Corporation
Silex Systems Limited
Sojitz Corporation
South African Nuclear Energy Corporation
(State Company Navoi Mining and Metallurgical Combinat, Uzbekistan)
State Nuclear Power Technology Corporation, China
Sumitomo Corporation
Swedish Nuclear Fuel and Waste Management Co (SKB)
Taiwan Power Company
TAM International Inc.
Techsnabexport (TENEX)
Teollisuuden Voima Oyj (TVO)
Terrestrial Energy Inc
Thomas Thor Associates
TimeLine Logistic International
Tohoku Electric Power Co Inc.
Toshiba Corporation
Total
TradeTech
TradeTech Energy LLC
Turner Harris
TVEL Corporation
UAB „VAE SPB“
Uranium Corporation of India Ltd
Uranium One Inc.
Urenco Limited
Ux Consulting Company LLC
Vattenfall AB
Wallich & Matthies Commodities
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www.wna-symposium.org

Join the Association

The Association offers many benefits for your company. Our members enjoy unrivalled international networking and business opportunities, as well as the chance to shape the nuclear industry across the world. The Association strategically promotes nuclear energy around the globe, helping to create new opportunities for your organization.

If you are interested in joining, please contact us using the below:

membership@world-nuclear.org
+44 (0)20 7451 1520