



WANO

GLOBAL LEADERSHIP IN NUCLEAR SAFETY

YEAR-END HIGHLIGHTS REPORT

2019

WANO.INFO
MEMBERS.WANO.ORG

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WANO VISION AND MISSION STATEMENTS

WANO VISION

WANO AND ITS MEMBERS WILL BE WORLDWIDE LEADERS IN PURSUING EXCELLENCE IN OPERATIONAL NUCLEAR SAFETY FOR COMMERCIAL NUCLEAR POWER.

WANO MISSION

TO MAXIMISE THE SAFETY AND RELIABILITY OF NUCLEAR POWER PLANTS WORLDWIDE BY WORKING TOGETHER TO ASSESS, BENCHMARK AND IMPROVE PERFORMANCE THROUGH MUTUAL SUPPORT, EXCHANGE OF INFORMATION, AND EMULATION OF BEST PRACTICES.

FOREWORD

EXERCISING OUR
COLLECTIVE
RESPONSIBILITY
FOR DELIVERING
WANO'S MISSION
TO MAXIMISE SAFETY
AND RELIABILITY



WANO'S LONG-TERM PLAN – COMPASS 2018-2022

In the 2018 Annual Report, WANO stated that a number of initiatives were being considered to help further improve member performance. Overall member plant performance levels have not significantly improved over the last few years and, more importantly, there remains a big gap between the top quartile performers and the bottom quartile performers. During 2019, the WANO Governing Board supported a 'Mandate for Change' and agreed clear industry targets for 2030 to drive performance to a higher level across all members.

Further changes to WANO arrangements were also proposed to help drive this performance improvement, and were discussed during the annual strategic review of priorities in October 2019 and supported by members during the WANO Biennial General Meeting. This initiative, that has subsequently been called *Action for Excellence*, is being developed and will be implemented in a phased manner in the coming years. The proposals are fully in line with the focus areas set out in *Compass 2018-2022*.

SHANGHAI OFFICE

WANO continues to progress towards establishing a fifth regional centre in Shanghai to support the major growth of the industry in China and it reached a critical milestone in 2019. In February 2019, an Extraordinary General Meeting of the WANO membership convened, and it approved proceeding with phases one and two of the WANO Shanghai Office project. Implementation of the first Branch Office phase commenced immediately.

Selection of a Shanghai Office director and four training delivery team leaders, one from each WANO regional centre, was completed by June 2019. Candidates for the technical staff were screened and nominated by the Chinese utilities. In all, eight team leader trainees, two alternate team leader trainees and 26 lead reviewer trainees were selected.

Documents required to register the Shanghai Office were prepared and submitted to the Shanghai Municipal Commission for Economy and Information (SMCEI) in December 2019. The SMCEI will serve as the Professional Supervisory Unit for the WANO Shanghai Office. Following review by the SMCEI, the documents were provided to the Shanghai Municipal Public Security Bureau (SMPSB), the approval authority for the office registration.

Completion of the registration process will allow the project to proceed with the activities needed to support opening the office in 2020. Those activities include tax registration, banking, office contracts, office construction and staff contracts.

EXPORT CONTROLS

Export controls restrictions continue to challenge WANO's ability to effectively support its members in the delivery of its vision and mission. Some geopolitical issues are increasing the difficulties in supporting members. Regional centres and their members continue to work with government authorities to enable the best support to be provided to members. In some cases, regional centres have made alternative arrangements to support members, including support from other regional centres that do not have the same export control restrictions.

WANO participated in the Nuclear Suppliers Group (NSG) Chair's outreach event with two other organisations representing the global civilian nuclear industry on 3 April 2019. The event addressed specific issues, such as technology and industry developments in the context of NSG guidelines and control lists. Subsequently WANO were invited to participate in an NSG outreach event at the 2021 Non-Proliferation Treaty Review Conference.

WANO will continue to seek to engage key stakeholders with the objective of educating them on WANO's nuclear safety excellence mission and influencing them to minimise the impact of export controls on WANO's activities.



TOM MITCHELL
Chairman



INGEMAR ENGVIST
Chief Executive Officer



**DR. NIKOLAY
MIKHAILOVICH
SOROKIN**
President

INTERNAL ASSESSMENT

The Post-Fukushima Committee recommended the implementation of a WANO Internal Assessment, which was approved by WANO members at the Shenzhen BGM in 2010. Following the approval, a full Internal Assessment of the regional centres and the London Office should be performed every four years. The first Internal Assessment was conducted in 2012, and then in 2016. The next should be conducted in 2020.

Due to the commitment to deliver the *Action for Excellence* initiative, which demands the engagement of those senior staff who would be involved in the Internal Assessment, the Governing Board approved postponing it until 2021. The regional centres and the London Office will conduct a self-assessment against the agreed criteria in 2020, and report the outcome to the Governing Board.

WANO PROGRAMMES

TO ACHIEVE ITS
MISSION, WANO
OFFERS MEMBERS
A SERIES OF HIGH
QUALITY SERVICES
THROUGH FIVE
PROGRAMMES



PEER REVIEW

In 2019, 49 plant peer review (PR) and 49 peer review follow-up (PR FU) visits were scheduled and conducted by the four WANO regional centres. The London Office continued work closely with the regional centres to provide governance and oversight through key observations of peer review teams, WANO Assessment Committee Meetings and peer review report quality. These efforts are designed to support and elevate regional centre performance in order to ensure maximum benefit to WANO members. This successful collaboration has resulted in more consistent and repeatable execution of peer reviews, increased challenge during the assessment rating meetings and improved report quality to the members.

Peer review frequency is another metric captured in order to ensure stations are evaluated in a timely manner to identify negative trends. The frequency is set on a four-year interval, with a one-year grace period, and the global delivery team's excellent 2019 performance resulted in a score of 96% of peer reviews conducted within the four-year frequency.

In addition, WANO conducted five Pre-Startup Peer Reviews (PSURs). The number of start-up-related Areas for Improvement began to show a decreasing trend as new units have taken proactive actions to improve operating crew performance, and enhanced foreign material exclusion controls contributed to fewer fuel failures utilising the lessons learnt from previous PSURs. The WANO Corporate Peer Review (CPR) process continued to mature throughout 2019. Many utilities continued to receive their 'second round' of CPRs, with eight being conducted in 2019, along with 16 CPR follow-ups.

The project of revising and improving the WANO Performance Objectives and Criteria (PO&Cs) document was also completed with the support and engagement of WANO worldwide staff and members. This has been a great example of continually challenging the existing performance criteria and raising the bar for station performance. For example, the latest revision included a refocused look at risk (RM.1, 'Integrated Risk Management'). This performance objective seeks to set a standard for measuring and understanding all facets of station risk. Furthermore, the revised PO&Cs made appropriate changes to the existing leadership objective, LF.1, which included a new section focused on sustainable results. This revision effort also included simplification of wording, and re-aligning the sequencing of the contents.

The PO&Cs are not just for WANO use during peer review visits. Members are encouraged to use the new document to benchmark their operations against industry best practices. There is a great value in the use of the PO&Cs for the ongoing internal self-assessments of performance, thereby increasing the safety and reliability of member stations and corporate organisations. The improvements of the PO&Cs will offer improved member benefits by re-establishing the 'gold standard' for nuclear safety and reliability.

WANO officially launched the document with a targeted communications campaign to the members before and during the 2019 Biennial General Meeting.



PERFORMANCE ANALYSIS

The Performance Analysis (PA) programme collects, screens and analyses operating experience (OE) and performance data, providing members with lessons learnt and industry performance insight reports. Fundamental to its success is the willingness of WANO members to openly share their OE and performance data for the benefit of other nuclear operators throughout the world.

The PA programme observed a slight decline in the number of events reported in 2019 when compared with previous years. Members shared 2,746 event reports in 2019 compared to 2,828 in 2018 and 3,304 in 2017.

To enable effective industry performance analysis, in accordance with WANO Programme Guideline 12 (WPG 12), *Industry Analysis*, capabilities in both the London Office and regional centres have been further developed. The objective is to identify trends in a particular region or in the industry, and to analyse specific member performance.

The PA team continues to issue monthly summaries of the main events reported to WANO. This summary is posted on the WANO member website to highlight events of potential significance to other members that may provide meaningful lessons learnt.

WANO Performance Indicators is a part of the PA programme. A set of performance indicators has been developed to enable members to exchange information and assess the performance of their plants objectively. WANO publishes a separate Performance Indicator trifold which carries more detailed information on these trends.



MEMBER SUPPORT

The Member Support team continued to deliver member support missions (MSMs) to WANO members at their corporate organisation or plant to close gaps related to safe and reliable performance. This support is provided at the request of a member, and aims to resolve issues either self-identified or identified as the result of WANO assessment activities.

In 2019, the regional centres and London Office conducted 239 MSMs, which is a similar number to previous years. The Member Support team either met or exceeded all its key performance indicators (KPIs) for the year, thereby achieving an uplift in the performance it delivered to members when compared to the previous year.

The main priorities of the Member Support Programme in 2019 included implementing a strong institute of WANO Representatives, optimising the balance between assessment and support, and delivering a graded approach of support to new builds.

Three WANO Process Descriptions, two WANO Programme Guidelines and one WANO Manual were revised and published by the Member Support Delivery Team in 2019, building a solid governance basis for member support.

The New Unit Assistance (NUA) process supports new units and new industry entrant organisations during the transition from a project phase, including construction and commissioning, to an operating phase of a company that is ready for safe and reliable operation. For WANO's NUA service, 2019 was a breakthrough year. The Member Support Delivery Team developed a set of tools, including 18 NUA modules, to assist new nuclear units.

WANO strengthened its collaboration with the International Atomic Energy Agency (IAEA) and the Electric Power Research Institute (EPRI) on supporting new units. They hosted their first ever joint side event on the resources and support available to help new units at the IAEA General Conference in Vienna, and together published a white paper on new unit support, which is available on WANO's public website. The side event enabled WANO to promote its expertise and services to a diverse global audience, and to build its engagement with stakeholders from newcomer countries.



TRAINING AND DEVELOPMENT

In early 2019, mindful of the development of *Action for Excellence*, a strategic review of the services that the Training & Development (T&D) Programme provides to members was held. As there is currently little evidence from peer review findings that training (TR.1) is an area of concern for members, a focus on member performance and non-traditional training programmes was proposed. As leadership is seen as a key driver for member performance, it was also decided to allocate more resources to this area.

In June 2020, the WANO executive leadership team approved the new strategic direction and a name change to Industry Learning & Development (IL&D). A new mission statement for the programme was developed and is currently being reflected in a revision to WANO Programme Guideline 03 (WPG 03): *Improve member performance by establishing and maintaining the highest level of knowledge and skills for all management levels of the industry, and positioning the IL&D function as the custodians and standard-setters for leadership and leader development.*

The new *Action for Excellence* initiative will direct the programme's mission in 2020 and beyond, and WANO has positioned itself to meet this challenge.

An example of the focus on leadership was a successful member-led working group which saw the development and subsequent Governing Board approval of PL 2019-01, *Nuclear Leadership Effectiveness Attributes*, which was launched at the WANO Biennial General Meeting (BGM) in October 2019.

The T&D (soon to be IL&D) function is now playing a key role in its dissemination to the industry, and is repositioning resources to help members through the development of guidance, tools and leadership programmes. There is also much internal work to do within WANO as a result of this new document in areas such as organisational diagnosis, internal training, leadership training materials and new programme guides.



CORPORATE COMMUNICATIONS

During 2019, the global communications team strengthened the organisation's communication and engagement with staff, members and external stakeholders. For WANO, 2019 was a landmark year – marking 30 years since the organisation was established. Several important changes were introduced throughout the year, and they required significant strategic counsel and project delivery from the global communications team.

They included the launch of a new office in Shanghai, the closure of the Hong Kong office, the importance of nuclear leadership, a revision of WANO's Performance Objectives and Criteria (PO&Cs) and a number of planned changes to senior leadership – including a new chairman, chief executive officer, Paris Centre director and Shanghai office director. The team also led the marking of WANO's 30th anniversary, and was instrumental in the delivery of the Chief Nuclear Officer (CNO) Forum in Tokyo and Biennial General Meeting (BGM) in London.

In support of the launch of its New Unit Assistance modules, WANO developed a web-page to provide information about the support WANO delivers to new units/entrants, including a new WANO-IAEA-EPRI industry white paper. WANO Atlanta Centre also conducted the first Communications new unit assistance support mission in 2019.

The regional centres organised Communications Expert Group Meetings for member communications professionals to discuss industry challenges and trends, share best practices and strengthen their global professional network.

Work continued across all regions to embed refreshed WANO branding that was developed in 2018, and new brand guidelines were published. The communications team created a special WANO 30-year anniversary logo used worldwide throughout 2019.

The WANO Communications team strengthened the organisation's relationship and engagement with the global nuclear trade media, and in doing so, raised visibility and awareness of WANO's services and achievements to key stakeholders. WANO also used social media to build engagement with key influencers through LinkedIn and Twitter.

The CNO Forum 2019 was conducted, building upon experience from previous forums. A 'speed networking' session created excellent networking opportunities for increased engagement among participants. Each regional centre also arranged their own Regional CNO Forums during the year.

The 2019 BGM was held in London and hosted by the WANO Paris Centre and EDF Energy. For the first time, WANO introduced a dedicated event application and four stands promoted WANO's key programme areas or topics: New Unit Assistance, Nuclear Leadership, Operating Experience and PO&Cs. Feedback from delegates on the BGM was positive.

GOVERNANCE AND STRUCTURE

WANO CONSISTS OF A WANO GOVERNING BOARD, A CENTRAL OFFICE IN LONDON AND REGIONAL CENTRES IN ATLANTA, MOSCOW, PARIS AND TOKYO, EACH WITH THEIR OWN REGIONAL GOVERNING BOARDS

During 2019, Jacques Régaldo served as WANO Chairman until his final Governing Board meeting in February, alongside Peter Prozesky as Chief Executive Officer (CEO) and Simone Rossi, CEO of EDF Energy, as President. Tom Mitchell took over as WANO Chairman from Jacques Régaldo on 1 March.

Dr. Nikolay Mikhailovich Sorokin, Deputy Director General – Inspector General at Rosenergoatom, succeeded Simone Rossi as WANO President on 23 October.

In October 2019, WANO held its 15th Biennial General Meeting (BGM) in London, United Kingdom. This conference provided an important opportunity for senior delegates to discuss the challenges the industry faces over the coming years under the theme of *30 years of WANO: Generating a Safer Future Together*. Key topics included corporate leadership, the support required for new entrants and units, maintaining a safe and reliable workforce, industry innovations, and a young generation view of the next 30 years of the nuclear industry. It was attended by approximately 450 senior representatives from WANO members.

Following a review of WANO governance, the WANO CEO and company secretary worked with the regional centres and WANO members to make changes to the following WANO Governance Documents throughout 2019: the Articles of Association; Charter; Policy Document 5, *Membership*; and Policy Document 6, *Governance*. The objective was to progress towards stronger alignment and consistency, and assist the Association in adjusting its governance in order to address its growing business and strategic objectives. The WANO General Assembly voted at the Extraordinary General Meeting (EGM) on 21 October to approve these changes.

Since the update to WANO Policy Document 5, *Membership*, efforts continue to bring new entrants to the industry into the WANO membership at the earliest stage of their project, under the new Category 5 membership option.

To complete the changes to WANO's governance structure, a new WANO Management Systems Manual was also approved at the 20 October Governing Board meeting. The manual describes a consistent set of processes and arrangements that define what 'One WANO' means in practice. In parallel, a revision was made to Policy Document 1, Document Approval and Index, which establishes the document hierarchy for WANO documents and the document management principles.



MEMBERSHIP

WANO: GROWING TO
MEET THE NEEDS OF AN
EXPANDING INDUSTRY

MEMBERSHIP BY CATEGORY

Category 1: 49 members

Category 2: 59 members

Category 3: 13 members

Category 4: 4 members

OTHER ORGANISATIONS
AWAITING AFFILIATION: 2

125

TOTAL MEMBERS



There were few membership changes in 2019, some of which were administrative.

In February 2019, the WANO Governing Board approved a new Category 2 membership application for Japan Nuclear Fuel Limited (JNFL) with affiliation to WANO Tokyo Centre. JNFL is a commercial nuclear fuel cycle company whose mission is to establish a nuclear fuel cycle and produce new energy for the future. A letter was also received from MVM Ltd in Hungary, formally requesting to withdraw their Category 3 membership effective as of 1 January 2019.

In June 2019, the WANO Governing Board approved a new Category 1 membership application for Akkuyu Nukleer Anonim Sirketi in Turkey, with affiliation to WANO Moscow Centre.

In September 2019, the WANO Governing Board approved a new Category 3 membership application for China Nuclear Energy Association (CNEA), with primary affiliation to the London Office, and secondary affiliation with each of the regional centres.

WANO MEMBERS*

*MEMBER DATA AS OF 31 DECEMBER 2019



ATLANTA CENTRE

Ameren Missouri

Arizona Public Service

Bruce Power

CANDU Owners Group

Centrala Nuclearelectrica
Cernavoda

China Huaneng Group Co., Ltd

China Nuclear Energy Association
(CNEA) (S)

Comision Federal de Electricidad

Dominion Energy

DTE Energy Corporation

Duke Energy Corporation

Emirates Nuclear Energy
Corporation

Energy Harbour Nuclear Corp.

Energy Northwest

Energy Nuclear

Eskom Holdings SOC Limited

Exelon Corporation

Haiyang Shandong Nuclear Power
Company (SDNPC)

Huaneng Shandong Shidao Bay
Nuclear Power Co., Ltd

Indiana Michigan (formerly AEP)

Institute of Nuclear
Power Operations

Luminant

Nawah Energy Company PJSC

Nebraska Public Power District

New Brunswick Power

NextEra Energy, Inc.

Ontario Power Generation

PG&E Corporation

Public Service Enterprise
Group, Inc.

Southern Nuclear
Operating Company

State Nuclear Power Demonstration
Plant (SNPDP)

State Power Investment
Corporation

STP Nuclear Operating Company

Talen Energy

Tennessee Valley Authority

Wolf Creek Generating Station

Xcel Energy Inc.

(S) = Secondary Affiliation



WANO MEMBERS*

*MEMBER DATA AS OF 31 DECEMBER 2019



MOSCOW CENTRE

"Haykakan Atomayin
Electrakayan" CJSC

Akkuyu Nukleer Anonim Sirketi

CEZ, a.s.

Concern Rosenergoatom

China Nuclear Energy Association
(CNEA) (S)

Federal State Unitary Enterprise
of Atomic Fleet (FSUE "Atomflot")

Fortum Power and Heat Oy

Ignalina Nuclear Power Plant

Jiangsu Nuclear Power Corporation

JSC "Atomenergoremont"

JSC "Atomtechenergo"

JSC OKB "Gidropress"

JSC Rusatom Automated Control
Systems (RASU)

Kozloduy NPP Plc

MVM Hungarian Electricity Private
Limited Company

MVM Paks Nuclear Power Plant Ltd

NNEGC "Energoatom"

Nuclear Power Corporation
of India Limited (S)

Nuclear Power Production and
Development Company of Iran

Paks II. Nuclear Power Plant Private
Company Limited by Shares

Republican Unitary Enterprise
"Belarusian Nuclear Power Plant"

Slovenské elektrárne, a.s.

State Specialized Enterprise
"Chernobyl NPP"

VNIIAES

(S) = Secondary Affiliation



WANO MEMBERS*

*MEMBER DATA AS OF 31 DECEMBER 2019

PARIS CENTRE

Asociación Nuclear Ascó -
Vandellós II, A.I.E. (ANAV)

Axpo AG

BKW Energie AG

CC.NN. Almaraz-Trillo, A.I.E.

CGN Lufeng Nuclear Power Co., Ltd

China General Nuclear Power
Corporation (CGN)

China Nuclear Energy Association
(CNEA) (S)

Daya Bay Nuclear Power Operations
and Management Co., Ltd

EDF

EDF Energy

EDF UK – Hinkley Point C (NNB GenCo.)

Eletronuclear S.A.

EnBW Kernkraft GmbH

Engie Electrabel

Forsmarks Kraftgrupp AB

Fujian Ningde Nuclear Power Co.

Guangxi Fangchenggang Nuclear
Power Co., Ltd (FCGNP)

IBERDROLA Generación Nuclear, S.A.

Kernkraftwerk Gösgen-Däniken AG

Kernkraftwerk Leibstadt AG

Liaoning Hongyanhe Nuclear
Power Co., Ltd

Magnox Ltd

N.V. elektriciteits -
Produktie maatschappij Zuid -
Nederland (EPZ)

Nuclear Decommissioning Authority

Nuclenor, S.A.

Nucleoeléctrica Argentina S.A. (NA-SA)

Nuklearna Elektrarna Krško

NNEGC “Energoatom” (S)

Orano

PreussenElektra

Ringhals AB

RWE Nuclear GmbH

Sellafield Ltd

Swissnuclear

Sydkraft Nuclear Power AB

Taishan Nuclear Power Joint
Venture Co. Ltd

Teollisuuden Voima Oyj (TVO)

Vattenfall AB

VGB PowerTech e.V.

Yangjiang Nuclear Power Co., Ltd
(YJNP)

(S) = Secondary Affiliation



WANO MEMBERS*

*MEMBER DATA AS OF 31 DECEMBER 2019



TOKYO CENTRE

China National Nuclear Corporation

China Nuclear Energy Association
(CNEA) (S)

Chubu Electric Power Company, Inc.

Electric Power Development Co., Ltd

Emirates Nuclear Energy
Corporation (S)

Fujian Fuqing Nuclear Power
Company Ltd

Hainan Nuclear Power Co., Ltd

Hokkaido Electric Power Company Inc.

Hokuriku Electric Power Company Inc.

Japan Nuclear Fuel Limited (JNFL)

Japan Nuclear Safety Institute (JANSI)

Japanese Nuclear Operators (JNO)

Korea Hydro & Nuclear Power Co., Ltd.

Kyushu Electric Power Company, Inc.

Nuclear Power Corporation
of India Limited

Nuclear Power Qinshan J.V.C., Ltd

Pakistan Atomic Energy Commission

Qinshan Nuclear Power Company Ltd

Sanmen Nuclear Power Company Ltd

Shikoku Electric Power Company, Inc.

Taiwan Power Company

The Chugoku Electric Power
Company, Inc.

The Japan Atomic Power Company, Inc.

The Kansai Electric Power
Company, Inc.

Third Qinshan Nuclear Power
Company, Ltd

Tohoku Electric Power
Company, Incorporated

Tokyo Electric Power
Company Holdings, Inc.

(S) = Secondary Affiliation





WANO

GLOBAL LEADERSHIP IN NUCLEAR SAFETY

ATLANTA
LONDON & SHANGHAI
MOSCOW
PARIS
TOKYO

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