2022 Working Together Towards Net Zero

JANUARY 2023 — *For COG, 2022 was a busy and transitional year. Working together, our members and stakeholders achieved tremendous accomplishments in nuclear science and towards net zero goals.*

Our mission to deliver excellence through collaboration has supported continued CANDU operations for nearly 40 years, and will continue to drive optimized performance, refurbishment and new technology projects for the next 40 years. It's incredibly motivating to think about the value and impact of COG collaboration in the delivery of safe, efficient and clean nuclear energy, both here in Canada and in our member-countries around the world.

As we dive into 2023, we want to take a moment to reflect on the highlights of 2022. With a track record of generating powerful synergies for our members and nuclear partners, we help them create solutions, transform, and perform – better, faster, and cheaper than they could on their own. We are committed to continuously enabling, sustaining and enhancing CANDU and advanced nuclear technology expertise, capabilities, and competence. And to evolving our organization to be even more effective and sustainable, without compromising our core focus and values, or any of the important work we do today.

The collective accomplishments reflected below are an important reminder that the solutions to our challenges exist in our current network - employees, peer groups, members, teams, suppliers. With continued collaboration, a net zero future is within our grasp.

New Leadership

This was a year of transition for COG's leadership. On December 5, 2022, Rachna Clavero returned to COG in the role of President and CEO, following five years with the organization from 2015-2020. Rachna brings multi-faceted experience from working across the industry with government, utilities and suppliers, including her most recent role as Senior Director, Strategic Growth & Innovation at Kinectrics, and various roles at Atomic Energy of Canada Limited (AECL), Candesco Corporation, SNC Lavalin, and the Ontario Ministry of Energy.

Rachna has hit the ground running to support effective and enhanced collaboration. On Day two she participated in the December 6 COG Board of Directors meeting and is already working actively with COG members, stakeholders and the leadership team to advance a review of COG programs to help push the organization forward as it evolves to meet current and future member needs.

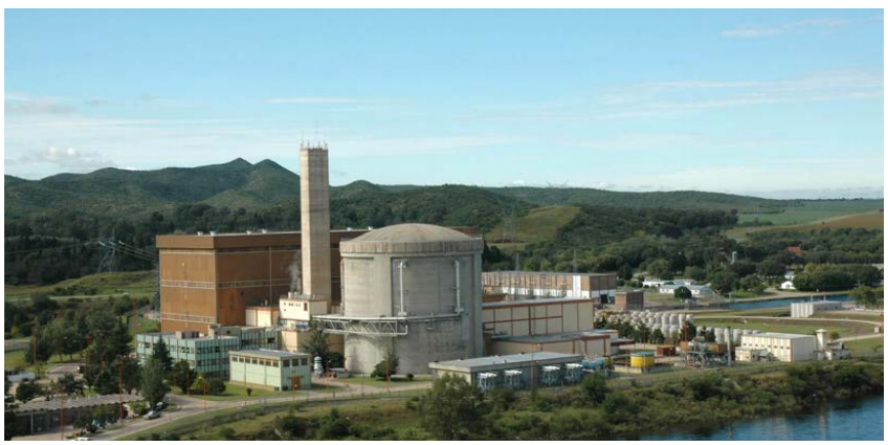
Rachna first joined COG in October 2015, where she developed the Strategic R&D program and helped the industry establish long term priorities for R&D, progressing from Program Manager of Research and Development to Director of Nuclear Safety and Environmental Affairs, before being appointed Deputy CEO.

Prior to Rachna's appointment, Liette Lemieux assumed the role of Interim President and CEO in May, 2022, following Stephanie Smith's resignation in April. Liette returned to COG following her retirement in November, 2021. From 2018-2021, Liette served as COG's Director of Research and Development, and she was appointed Deputy CEO in June, 2021. COG thanks Liette for the significant contributions she made in her time with the organization, and for providing strong leadership, stability and momentum while the board conducted its rigorous search and interview process.

As well, in June, 2022, Ontario Power Generation's Leslie McWilliams joined the COG board of directors, replacing outgoing director Carla Carmichael. Leslie has more than 20 years of nuclear experience in Engineering, Chemistry, Maintenance, Outage and Project Management. As Vice President, Advanced Inspection and Maintenance at OPG, Leslie is an energetic and innovative leader who brings notable skills and experience to COG's board.

Above: COG President and CEO Rachna Clavero; Right: Leslie McWilliams joined COG's board in June, 2022

Agility and Innovation to Support Member Success



Images: The Embalse Nuclear Plant, owned by Nucleoeléctrica Argentina Sociedad Anónima, a COG member since 1986 ; a Halden lab; COG's commitment to HS&E

Stronger, longer plant performance through innovation

Together with its members, suppliers, research, and partner organizations, COG works to solve the industry's most challenging technical problems, share operating experience and work toward regulatory acceptance.

When combined with joint project work completed on behalf of participating members, COG delivered more than $75 million worth of projects in its 2021-22 fiscal year. Year-over-year, this work has supported our members in achieving exponential value and ever-greater accomplishments in plant safety, reliability, human and environmental performance and cost reductions.

For example, through analytical, modeling, experimental research and surveillance done via COG's Fuel Channel Life Management (FCLM), Spacer Life Management (SLM) and Fuel Channel Research and Development projects we have helped secure extended operations of the domestic CANDU fleet, and look to leverage this work to support refurbishments in our international member-countries. Collectively, we are increasing the lifespan of CANDU utilities and positioning the industry to consider a second refurbishment to get more usage from these assets. Below are selected highlights of how COG members, suppliers and program participants are accessing COG's international network, expertise, partners and resources from around the world:

- COG is providing ongoing critical support to Canada's operating nuclear fleet, with the fuel channels R&D program becoming the primary funding partner for updating Canadian Standards Association (CSA) N285.8 standard, which specifies mandatory technical requirements and non-mandatory evaluation procedures for fitness-for-service assessments related to pressure tube inspections.
- The fuel channels pressure tube and garter spring surveillance program was busier than ever in 2022, with five active surveillance projects valued at more than $30M. These activities are critical for license maintenance, and all projects have submitted their compliance testing reports on time.
- COG continues to provide agile, timely support to the industry in ensuring pressure tubes integrity and meeting related regulatory requirements, in line with our members' foremost commitment to safety.
- A recently completed project evaluated and compared commercially available neutron survey meters in order to address aging and obsolete technology. Based on our evaluation, COG members were able to select appropriate detectors to be deployed at sites for continued dose monitoring in alignment with CNSC regulations and As Low As Reasonably Achievable (ALARA) principles.
- COG's Chemistry, Materials and Components (CM&C) program successfully completed a first work-in-kind collaboration agreement with Nucleoeléctrica Argentina Sociedad Anónima (NA-SA) (Embalse) related to the use of alternative amines for chemistry control. The OPEX from Embalse, along with their review of the test plan and other information provided, enabled a streamlined test plan for ETA and reduced time and cost to complete the testing. In return, a credit has been set up for Embalse to access COG products or research results in kind.
- COG's Health, Safety & Environment (HS&E) Program has established a Groundwater Working Group, which includes technical experts from the Canadian Nuclear Safety Commission (CNSC) as observers. This first-of-its-kind format allows for focused technical discussions to take place among experts, alongside information exchange with representatives from regulatory organizations. This improves transparency for regulators by providing timely access to information, as well as enhanced understanding of R&D results, paving the way for potential adoption of novel and improved methodologies.
- COG facilitates shared membership with Canadian Nuclear Laboratories (CNL) and the CNSC in the Halden Human-Technology-Organization (HTO) Project; the project is operated by the Institute for Energy Technology (IFE) in Norway and is supported by numerous research regulatory and industry organizations from 11 countries. The 2021-2023 Halden HTO goal is advancing in the Human-Technology Organisation (HTO) field by working on aspects of human performance, reliability and organisation in various stages of the plant life, including during accident situations. In 2022, COG co-hosted a number of well-received workshops for COG members and other industry stakeholders; we are currently planning additional sessions and collaboration opportunities.
- As the CNSC continues to review and update its regulatory documents, COG and its members conducted thorough revisions of new drafts to understand their impact on the operation of the current nuclear fleet. COG coordinated the gathering of extensive feedback and suggested changes. Also in 2022, COG and its Members held semi-annual meetings with CNSC Directors to exchange information on current and planned R&D projects as well as to discuss a variety of licensing issues.

A Return to In-Person Collaboration

Technical Committee Meeting in Romania

What do you get when you bring together 65 in-person participants in Constanta, Romania, representing seven countries, eight COG members, six suppliers, and two regulators? Excellence through collaboration!

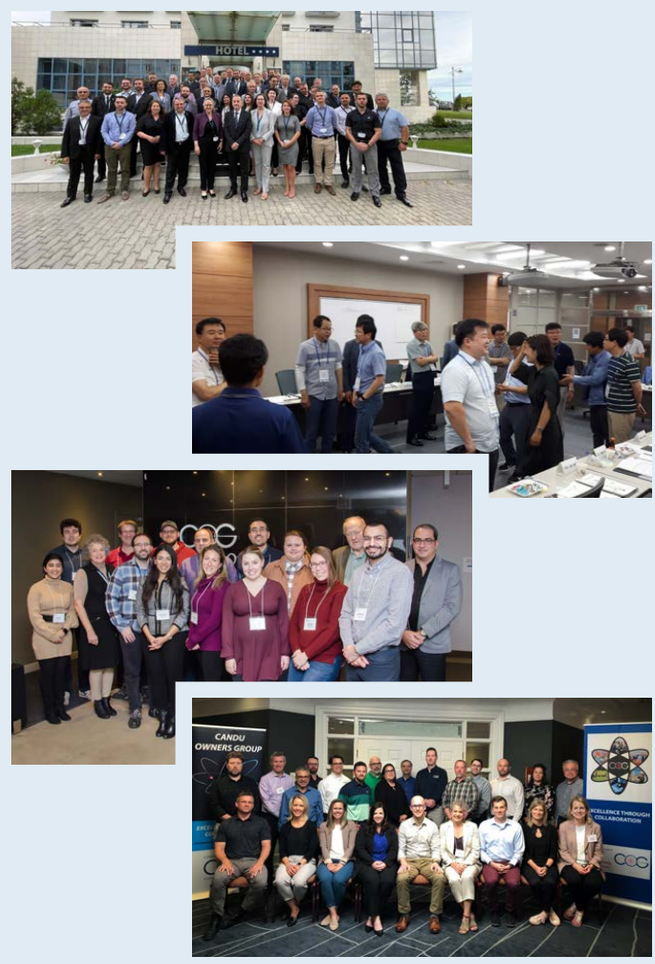
From September 12-16, COG and the IAEA facilitated the 16th Technical Committee Meeting (TCM) in cooperation with our host-member, Societatea Nationala Nuclearelectrica (SNN). The meeting, which generally takes place every two years (with a one-year delay as a result of the pandemic), has three objectives:

1. Exchange operating experience, lessons learned and best practices on Fuel Handling Operations, Outage Optimization, Equipment Reliability and Condition Based Maintenance through interactive workshops and visits.
2. Generate Solutions, synergies and new opportunities to collaborate towards continuous improvement of the CANDU operating fleet.
3. Foster connections and expand networks through collaboration with international industry colleagues and experts.

In 2022 we had excellent participation from all of the utilities and supplier organizations. Canada's Ambassador in Romania, Bulgaria and Moldova, Annick Goulet kicked off the event. A highlight was a site visit to Cernavoda NPP. Sincere thanks to our gracious and well-organized hosts at SNN.

Participants noted that the in-person format was extremely valuable following two years of COVID constraints, and took advantage of the receptions, lunches, dinners, coffee breaks and other organized sessions to build networks, expand understanding and foster connections.

This year's format was designed differently to previous TCMs. Responding to feedback from our members, we shifted the format to fewer topics delivered in a workshop format, followed by an hour or more of interactive discussions after each presentation, enabling more questions, dialogue and interaction, and empowering participants to take a deeper dive into areas of interest and priority. We received a positive response from participants and plan to maintain this format for future TCMs.



From top to bottom: Participants at the 16th TCM in Romania; KHNP leaders participating in Leadership and Safety Training; COG's SP-FLS training participants; and one of the NPDS classes of 2022.

Resumption of in-person learning, development and training

In 2022, following the loosening of local and global restrictions related to the COVID-19 pandemic, we were able to relaunch our Nuclear Professional Development Seminars in June and November featuring refreshed content, instructors, nuclear plant site visits, and a new venue. This program helps to foster the next generation of nuclear leaders, with participants from COG members and suppliers including Ontario Power Generation, Bruce Power, New Brunswick Power, Canadian Nuclear Laboratories, SNN and BWXT.

Additionally, we were able to relaunch the Supplier Participant First Line Supervisor course in December. The course empowers nuclear industry suppliers to strengthen their understanding of the nuclear culture and develop their leadership skills. Participants represented 6 organizations including, Cameco, Calian Nuclear, BWXT, MDA, Alithya and SNC Lavalin.

Our overseas training programs also resumed, allowing us to deliver four in-person Leadership and Safety Culture courses in Korea for Korea Hydro & Nuclear Power (KHNP) leaders. These courses have addressed a key area of focus for KHNP leaders through opportunities to enhance their knowledge of Safety Culture and apply it directly to their respective roles.

From May 9 to 20, COG hosted the COG-International Atomic Energy Association (IAEA) Nuclear Energy Management School in Oshawa at Ontario Tech University. In attendance were 13 international students from ten countries, as well as another eight participants from Canada, with several presentation topics delivered by Canadian subject matter experts.

COG participated in NWMO's Industry Day in December, 2022

A Collective Commitment to Waste Management

In 2022, COG continued to support an aligned industry approach to waste management, through facilitation of a team of experts representing all Canadian COG members to produce a series of white papers on the disposal of low and intermediate level radioactive waste in Canada. These deliverables serve as supporting documents to the previously issued COG Integrated Radioactive Waste Strategy of Canada and are available on COGonline.

Also in 2022, both Natural Resources Canada (NRCan) and the Nuclear Waste Management Organization (NWMO) published a new policy for Radioactive Waste Management and Decommissioning and an Integrated Strategy for Radioactive Waste, respectively. Along with its Members, COG coordinated the work needed to assess the effect of these two new proposals on the current industry practices, and future plans and projects.

Facilitating the Next Generation of Nuclear

The nuclear industry is working together to make certification training more attractive and accessible to a diverse population by enhancing program delivery and reducing duration to approximately 24 months, while maintaining or improving throughput and adherence to nuclear safety standards.

Integral to the project is the first ever Canadian Nuclear Power Utilities benchmarking of the Initial Certification Training program, which identified 54 noteworthy practices. Through 15 hours of information exchange, industry peers shared insights and best practices to inform opportunities for collective improvements, socialize upcoming regulatory changes, build awareness of the overall Certification Training Program Optimization initiative, and facilitate networking for certification training working level staff.

Through COG, nuclear power utilities are working together toward these shared goals, and coordinating industry interface with the CNSC.

Stronger Capabilities to Support Member Needs

At the end of 2021, COG's Nuclear Safety Culture & Assessment Toolset web application completed testing and went live. The platform enables COG members to save time and resources while enhancing quality and consistency by standardizing the process for safety culture assessments, surveys, interviews and analysis, and enabling real-time feedback from employees and contractors.

COG continues to advance a multi-year initiative focused on improving our data management and OPEX search functionality through the members-only COGonline platform. Following last year's deployment of the new OPEX database, this year we've integrated the Newsgroups and Q&A Forums into a single application that allows for faster searches and an improved interface. To further streamline and enhance access to real-time information, we've integrated a single-sign on for access to OPEX Records and Forums and enhanced Newsgroups access.

While in-person connection will always be an essential component of excellence through collaboration, a learning from the COVID-19 pandemic we are carrying forward is our enhanced hybrid event management capability. Remote presenters and participants can now fully participate in COG-hosted events from anywhere, anytime. All of COG's meeting rooms have been upgraded for a seamless hybrid meeting experience. And when we're hosting off-site meetings, our IT team has curated a unique combination of Audio/Video & digital interfaces, enabling a consistent experience for all participants, regardless of location.

Building the Future, Together

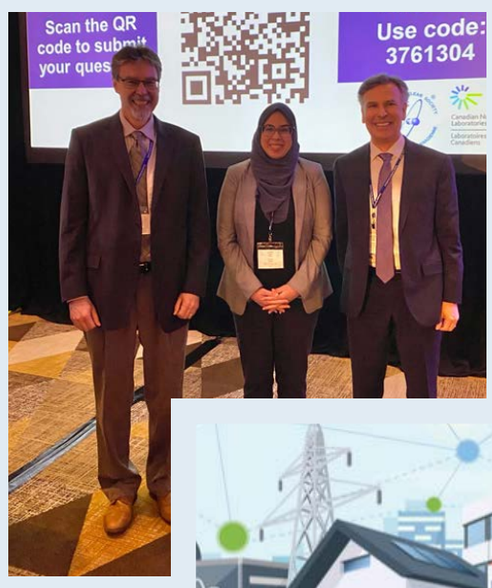
Through COG, members, Small Modular Reactor (SMR) vendors and partner organizations are sharing information, pooling resources, and working together to develop and deploy SMRS in support of climate change goals.

Together with the Canadian Nuclear Association (CNA), COG supports the Canadian Nuclear Industry SMR Secretariat. The Secretariat engages Team Canada (the enabling partners from the federal government, provinces and territories, Indigenous Peoples and communities, power utilities, industry, innovators, laboratories, academia, and civil society), and tracks and documents the progress of actions.

COG also supported the preparation of position papers on fuel supply, fuel enrichment, and fuel reprocessing to perform a landscape analysis of the various benefits, challenges, and issues around introducing uranium enrichment into Canada, and the challenges and gaps regarding the disposal of SMR waste.

As well, COG works with the World Nuclear Association on the Nuclear Harmonization and Standardization Initiative sponsored by the International Atomic Energy Agency, which aims to achieve an international common understanding of the applicability of codes and standards used in the design and licensing of nuclear power plants.

COG will continue to support the Canadian nuclear industry in resolving technical issues related to the safe operation of CANDU reactors, as well as the advancement and deployment of SMR technologies. COG's infrastructure is ideal for additional partnerships with utilities and SMR vendors interested in completing their designs with additional R&D or joint projects, and in achieving a common resolution of licensing issues.



COG's John DeGrosbois, Sonia Iqbal and Carlos Lorencez at the 4th International Conference on Generation IV and Small Reactors (G4SR-4) in October, 2022

Looking Forward

With 2023 well underway, the work we're doing together will continue to be of great importance as the world works to address the increasingly pressing impacts of climate change while ensuring a safe, secure energy supply. We're seeing this with our members, with the potential redevelopment of Pickering, a new build on the horizon at Cernavoda, and the potential for an extension at KHNP. We remain focused on helping those members be successful. At the same time, we have a real opportunity to help bring new nuclear technologies to fruition.

The past few years have made it clear that net zero needs nuclear, and in addition to supporting our members' current needs, our team remains focused on advancing the critical work being undertaken to evolve COG as an organization in response to changing member needs. Working together towards our collective clean energy future is the essence of *excellence through collaboration.*

Save the date for COG Collaboration Week June 25-29 (see below), and stay up to date on COG news and updates through our public website, www.candu.org, members-only platform, COGonline, and by following us on LinkedIn.

SAVE THE DATE

COG COLLABORATION WEEK

June 25–29, 2023

Marriott on the Falls
Niagara Falls, Canada

Theme: Asset Management and Innovative Solutions

Join your industry colleagues at CCW for:

- An inside look at COG Programs & Services
- Interactive workshops & peer group meetings
- Lots of networking events and opportunities to connect with fellow Canadian and international COG members, suppliers, and industry experts from EPRI, IAEA, and other partner organizations.

Generate. Innovate. Collaborate.

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