



CNS UPDATE

MESSAGE FROM THE PRESIDENT



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We are approaching the anniversary of the start of the COVID 19 virus in Canada. In spite of the great progress in development of the multiple vaccines, the majority of the populations around the world still await to receive the vaccines. The authorities continue to emphasize social restrictions and, in light of the fast-spreading virus variants, people are not likely to gather in large numbers. As a result, there is no possibility of return to in-person events in 2021. All the CNS events including the 2021 CNS Annual and Student Conferences, AI and Machine Learning, the G4SR conference as well as courses and webinars will remain online events. These CNS events will continue to keep our stakeholders engaged.

The overwhelming national and international enthusiastic participation and extremely positive feedback from the 2020 virtual events is a testimony to the important role CNS continues to play by enabling the sharing of scientific knowledge and innovations and the training of young professionals for the nuclear industry.

CNS needs your continued support to fulfill its vision and mandate. I urge you to renew your CNS membership, or join again if your membership has lapsed. You can do this by visiting the CNS website (www.cns-snc.ca), which also contains more information about CNS activities, available vacancies and opportunities for members to become actively involved in CNS Divisions, Branches and Committees. You can provide your feedback by e-mail to cns_office@cns-snc.ca *Note: "cns underscore office"

CNS POST-COVID-19 TASKFORCE UPDATE

The following updates and summarizes the various initiatives of the Task Force.

- Implementation of X-CD software is progressing well
- A Task Force under the Education Committee's work is continuing to: :
 - recommend enhancements of CNS existing courses and plan new ones, in collaboration with UNENE and other organizations
 - review and recommend fair honoraria for CNS course developers and lecturers
- The CNS website sub committee has developed requirements and are proceeding to solicit proposals from various vendors.
- Creation of a CNS promotional Video for use in the CNS booth at events and on the Website is being planned.



POSTING FOR THE POSITION OF CNS OFFICE MANAGER

After 12 years at the CNS as the Office Manager, Robert O'Sullivan has decided to move on. Bob has been the face of CNS all these years and we will miss his dedication and hard work in keeping the CNS office running smoothly. Bob has accepted to stay on until CNS finds a replacement by the end of his current contract. We wish Bob all the best in his new endeavours.

BELOW IS THE POSTING TO FILL THE VACANCY FOR THE POSITION OF CNS OFFICE MANAGER



Office Manager
Canadian Nuclear Society
<https://www.cns-snc.ca>

About the Canadian Nuclear Society

The Canadian Nuclear Society (CNS) is a not-for-profit federal corporation that promotes the exchange of information on all aspects of nuclear science and technology. It comprises ~1000 members and has a client base of ~5000 registrants that participated in CNS events (conferences, seminars and courses). Generally, each year, the CNS holds one annual conference, about three topical conferences, and 3 to 6 technical courses/lectures open to members and the public. The CNS has branches across Canada to provide benefits to Members and engage the public by holding periodic meetings within their geographical areas.

The Opportunity

The CNS Office Manager is the hub of CNS activities and to many is the "face" of the CNS. The Office Manager utilizes and manages a proprietary Membership and Event Registration content management system as the primary tool to support the various CNS activities. Details include: manage and monitor the front-end experience, verify the Profile Home page has the necessary functions, manage the database for updates and corrections and manage financial transactions associated with the system. The Office Manager issues invoices and receives revenues and works closely with the CNS Accountant.

As Registrar for events, the Office Manager works with the various CNS committees chairs as required to build registration portals in the Membership and Event Registration system and assist in communication with members and the public (such as group mailings and responses to inquiries). The Office Manager is expected to assist in registration duties at the larger in-person events. These events generally take place in Ontario and occasionally in other provinces. These events may start on Sunday and run up to 4 days. Post conference, the Office Manager administers the conference archives (Proceedings). Membership services is an important aspect of the position and includes supporting membership renewal, transmitting CNS event notices/announcements, managing the membership mobile application and responding to member inquiries.

General office-management duties include ordering supplies (including CNS products), shipping and receiving, arranging meeting venues, supporting committee/Branch/Event chairs in uploading files to the CNS website, supporting the CNS Annual Election Process and performing occasional special assignments.

The Office Manager works from home and is largely self-directed. It is a contract position. Work schedule is largely dependent on the timing of events and other targeted activities and may require approximately 1200 hours annually.

Qualifications

1. Be a Community College Administration Grad, or demonstrate equivalency
2. Have some proficiency with a content management system. This would apply to someone using a 3rd party software tool to engage & interact with clients (such as Microsoft Share Point, Shopify). Bonus:
 - a. Experience with the X-CD registration system,
 - b. Experience working with a software vendor to implement a content management system.
3. Demonstrate proficiency with the MS Office (WORD, EXCEL, OUTLOOK)
4. Experience processing invoices (expenses & revenue). Familiarity with accounting systems Bonus: Familiarity with Quickbooks
5. Experience dealing with clients and/or members
6. Nice to have:
 - a. Experience in not-for-profit organization/company
 - b. Capability and interest in social media
 - c. Experience in managing events
 - d. Experience with MailChimp
 - e. Experience with Survey Monkey

Application

Please submit your resume to the CNS Secretary, cns_secretary@cns-snc.ca, highlighting your professional experience related to the qualifications for this position.

SMR, AN ALBERTA INNOVATES LEARN-HOW SERIES



VIDEO TOUR : NUCLEAR POWER DEMONSTRATION (NPD) REACTOR

please click on the links below

NPD Decommissioning Part 1 NPD
<https://youtu.be/FAgkd6-WQ7g>

Decommissioning Part 2
<https://youtu.be/DDmfRUyr45g>

THE CANADIAN NUCLEAR ASSOCIATION RAMPS UP SUPPORT FOR FEDERAL FUNDING FOR NUCLEAR IN LEAD-UP TO BUDGET

With the SMR Action Plan launched, the CNA is focused on the anticipated March federal budget and on reinforcing the importance of including funding for nuclear technology and SMRs.

While our efforts over the last 18 months have led up to this point, the CNA has increased activity during this crucial period to support education about nuclear and its many benefits. There has been a focus on showcasing support for the industry, highlighting the role that nuclear plays as we march toward net-zero 2050 and building an understanding of how nuclear can contribute to a strong green recovery from the COVID-19 pandemic.

These efforts were further supported by the release of a 2021 study commissioned by the CNA, revealing that a significant number of Canadians believe government should invest in clean technologies, including renewables and nuclear energy, despite competing economic priorities.

In addition to its pre-budget push, the CNA continues to support other key priorities of the nuclear industry, including traditional nuclear and uranium. Our international efforts on these files focus on both policy and business development.

January was a key month, with the CNA announcing the signing of a memorandum of understanding (MOU) with FORATOM to collaborate in nuclear and promote clean, innovative and advanced nuclear technologies. The MOU was shared with the parliamentarians on the Canada-EU Parliamentary Committee which demonstrates the industry's strategic value to Canada.

Also in January, the CNA submitted its Response to Ontario's Low-Carbon Hydrogen Strategy Discussion Paper. The paper discussed how the nuclear industry can play a significant role in developing hydrogen through its ability to generate large volumes of non-emitting, reliable, low-cost heat and electricity.

For more information on the CNA's efforts to promote the nuclear industry in the lead-up to the budget and beyond, visit www.cna.ca.

CNS EVENTS 2021-2023

CNS Events 2021				
	Date	Venue	Division Chair	Division
CNS Short Course on CANDU Reactor Technology (Online) - Part 2	Mar 22-23	Online	Wei Shen	NSED
41st Annual CNS Conference & 45th Annual CNS/CNA Student Conference	June 6-9	Online		
STORI Workshop - Radioisotopes, Science, Technology & Safety	June	TBD	Chary Rangacharyulu	STORI
CNS Short Course on CANDU Reactor Technology (Online) - Part 3	July	Online	Wei Shen	NSED
CANDU System Chemistry Course	Sept 26	Online	Mohammad Baghbanan	MCFD
2nd Intl Conf of Materials, Chemistry & Fitness-for-Service-Solutions for Nuclear Systems (MCFD-2021)	Sept 27-28	Online	Mohammad Baghbanan	MCFD
CWFEST-2021 (Canadian Workshop on Fusion Energy Science and Technology)	Oct/Nov	Online	Blair Bromley	FEASTD
G4SR-2 Webinars – bimonthly		Online	Wilson Lam	G4SRT
2nd Symposium on AI, ML and other Innovative Technologies in Nuclear	Oct/Nov		Moe Faedee	
CNS Short Course on CANDU Reactor Technology (Online) - Part 1	Nov	Online	Wei Shen	NSED
G4SR Virtual Summit	Nov	Online	Wilson Lam	G4SRT
CNS Events 2022				
	Date	Venue	Division Chair	Division
CANDU Technology & Safety Course	Mar 21-23	Toronto	Wei Shen	NSED
CANDU Maint. & Nuclear Comp Conf.	Spring		Nathan Bruns	NOM
42nd Annual CNS Conference & 46th Annual CNS/CNA Student Conference	June	TBD		
11th Intl Conference on Isotopes	Jun 19-23	Saskatoon	Chary Rangacharyulu	STORI
FSEP	Sept 21-23	TBD		
CNS International Conference on Waste Management, Environmental Restoration and Decommissioning	Sept	Ottawa Marriott	Parva Alavi	EWMD
15th International Conference on CANDU Fuel	Fall	TBD	Mukesh Tayal, Paul Chan	FT
Generation IV and Small Reactors International Conference, G4SR-3	Oct 2-6	Delta Airp, TO.	Wilson Lam	G4SRT
CNS Events 2023				
	Date	Venue	Division Chair	Division
Int'l Conf on Math. & Comp. Methods App. to Nucl. Sci. & Eng. (M&C 2023)	Aug 13-17	Niagara Falls, ON	Wei Shen	NSED
CANDU Fuel Technology Course	Fall		Mukesh Tayal, Paul Chan	FT
CWFEST 2023	Fall	Online	Blair Bromley	FEASTD

G4SR EVENTS

Following the recognized great success of the G4SR-2 Virtual Summit, the G4SR Organizing Committee has continued to make plans for G4SR events.

In view of the ongoing pandemic and the uncertainty with respect to holding large gatherings and with respect to the possibility of travel with confidence, the next in-person International Conference, which is being named G4SR-3, has now been postponed to 2022 October 2-6. Put this date in your calendar! G4SR-3 will be held in the Delta Hotel Toronto Airport and Conference Centre, the great venue which we have been planning to use since before the pandemic arrived.

We have started a survey to get the feedback and suggestions on the potential participation of the G4SR-3 in-person conference. While the survey responses are coming, based on 120 responses received so far, there is at least 67.5% of "Likely" participation from the survey. More importantly, we received great suggestions for the event. Thanks very much for participating in the survey!

Although G4SR-3 is two years away, we have big plans for this year. We plan to repeat the 2020 success by holding once again an online 2-day G4SR Virtual Summit, tentatively on 2021 November 15-16. The 2021 Virtual Summit will feature Plenary Sessions, as did the first Summit. Planning is underway, please stay tuned for further details in the coming announcement.

Online, free G4SR Technical Webinars will continue until the Virtual Summit. These Webinars will cover topics of great interest.

For 2020, we have archived the recordings and presentations for the G4SR webinars in this link:

CNS | 2020 G4SR Webinars (cns-snc.ca)

For 2021, the G4SR Webinars can be found in this link: CNS | 2021 G4SR Webinars (cns-snc.ca)

We also keep abreast of the important international Webinars on G4SR. Please explore this link for details: CNS | Important International G4SR Webinars (cns-snc.ca)

In order to avoid attendees' webinar fatigue, the Technical Webinars will be presented bi-monthly. In fact the next Webinar will be held very soon, on March 18:

Title: Nuclear-Renewable Hybrid Energy Systems – Special Session on Research at Canadian Nuclear Laboratories

Webinar Date: 2021 March 18

Time: 10:00-11:30 EST (UTC/GMT-5)

The G4SR-2 Technical Program Organizing Committee is pleased to present a technical webinar series with invited speakers from the G4SR-2 technical program. Speakers will deliver presentations on their work and answer questions from the audience in a moderated Q&A session.

Agenda		
Host Remarks	Wilson Lam (CNS)	2 min
G4SR-2 Technical Webinar Series Introduction	Dave Hummel (CNL)	2 min
Webinar Session Introduction	Gordon Burton (CNL)	5 min
Assessment of Nuclear Renewable Hybrid Energy System (NR-HES): Technical-Economic Approach	Ayman Mahmoud (CNL)	25 min
Feasibility and Benefits of Nuclear Reactor Hybrid Energy Systems: A Remote Community Case Study	Pronnapa Sanongboon (CNL)	25 min
Audience Q&A		15 min

Webinar Session Chair:



Dr. Gordon Burton, Manager (acting) – Hydrogen Technologies Branch, Canadian Nuclear Laboratories | G4SR-2 Nuclear-Hybrid Energy Systems Track Co-Chair

Gordon has enjoyed a 25-year career with AECL/CNL as a research scientist developing sensors and software tools to make better use of the chemistry and process data at CANDU® stations, and providing secondary side chemistry support to the stations. He is presently using his background in chemistry and physics as the Manager of the Hydrogen Technologies Branch to provide oversight to all research related to hydrogen production, safety, use, and storage, heavy water production, and tritium.

Topic 1

Assessment of Nuclear Renewable Hybrid Energy System (NR-HES): Technical-Economic Approach



Dr. Ayman Mahmoud, Thermalhydraulics Analyst, Canadian Nuclear Laboratories

Dr. Ayman Mahmoud is a Professional Engineer/Thermalhydraulics Analyst at CNL and an Adjunct Professor at Ryerson University. Dr. Mahmoud is a technical task lead/technical lead for various Federal Nuclear Science and Technology (FNST) projects and commercial projects at CNL that involve Nuclear-Renewable Hybrid Energy Systems and SMRs for Green Mining projects. Prior to joining CNL, he was a technical lead for an underground energy storage system project to develop an innovative solution for the Ontario residential sector to improve system longevity and feasibility in Canadian climates.

The project involves technical teams from McMaster University, University of Toronto, and Ryerson University. Dr. Mahmoud has an impending patent in energy storage pile design and published more than 20 peer-reviewed journal articles in top journals. Also, he designed and contributed to over 10 experimental setups and prototypes to examine various innovative heat transfer techniques and sustainable energy systems.

Abstract: The present paper presents a technical-economic analysis of a nuclear renewable hybrid energy system (NR-HES) case study for given electricity and residential heat demand profiles of a typical community in Canada. The NR-HES is composed of a small modular nuclear reactor (SMR), a concentrated solar tower (CST) and a thermal energy storage (TES) system. Three different thermal storage fluids are examined. A transient thermodynamic mathematical model is developed in order to determine the overall configuration, performance and operation strategy. Also, a detailed economic analysis is conducted to estimate the annual revenue and profit generated by the TES system. Based on the current case study in terms of demand profiles, the results revealed that Hitec XL salt is the most economical thermal storage fluid for the studied NR-HES with economic profit and round-trip storage efficiency of 335,845 CAD/year and 97%, respectively.

Topic 2

Feasibility and Benefits of Nuclear Reactor Hybrid Energy Systems: A Remote Community Case Study



Dr. Pronnapa Sanongboon, Operations Research Analyst, Canadian Nuclear Laboratories

Dr. Pronnapa (Lek) Sanongboon is an Operations Research Analyst at Canadian Nuclear Laboratories, where she is working on studies of feasibility and benefits of advanced nuclear reactor hybrid energy systems. With her expertise in optimization and energy modelling, she developed a Hybrid Energy System Optimization (HESO) model to evaluate the economic and greenhouse gas emissions impacts. The model has been used to study several aspects of nuclear-renewable energy systems for off-grid mining and remote communities.

It led to federal government collaborations as well as industrial partners. Dr. Sanongboon received her PhD in Engineering specializing in optimization and operations research. Prior to joining CNL, she taught advanced operations research, engineering mechanics, and system dynamics in the Faculty of Engineering and Science at the University of Regina.

Abstract: As Canada is transitioning to the new clean economy, many Canadian remote communities still rely on fossil fuels to meet their energy needs. In supporting energy planning, the Hybrid Energy System Optimization (HESO) model has been developed to study feasibility and benefits of nuclear hybrid energy system in a Canadian northern remote community. The model is formulated as a large-scale linear programming algorithm. By minimizing annual cost with the carbon tax induced, it determines the best energy mix, subject to technology limitations and specifications. Different energy scenarios have been carried out to understand challenges and determine which alternative sources will significantly reduce greenhouse gas emissions, while also lowering the energy costs. These scenarios concern electricity demand and heat demand for space heating through electrification and district heating. The results suggested that nuclear-generated electricity and renewables will play a key role while transitioning into the low carbon economy.

Series Chair

G4SR-2 Technical Webinar Series Chair:



Dr. David Hummel, Research Scientist, Canadian Nuclear Laboratories | G4SR-2 Technical Program Chair

Dr. David Hummel is a Research Scientist at Canadian Nuclear Laboratories (CNL). He received his Masters and PhD degrees from McMaster University in Engineering Physics. In 2015 he joined the Containment Response Section of what was then the Fuel & Fuel Channel Safety Branch at CNL's Chalk River site. He has since contributed to the experimental and computational study of containment and radionuclide transport behaviour in support of the CANDU industry, and most recently, to the study of advanced reactor and small modular reactor (SMR) accident phenomenology.

Dr. Hummel has served as project leader, principal investigator, or researcher on multiple projects concerning SMR safety and studies of accident phenomenology within CNL's Federal Science & Technology program. Dr. Hummel has also represented Canada in International Atomic Energy Agency meetings on advanced reactors and SMR safety, and has contributed to the organization of multiple conferences hosted by the Canadian Nuclear Society. He is currently serving as the Technical Program Chair for the Second Generation IV & Small Reactors (G4SR-2) conference.

UPCOMING CNS COURSE ON CANDU TECHNOLOGY (ONLINE) - PART 2

Course Overview

The CNS CANDU Technology and Safety Course, held for the last many years in a physical setting over 3 days in March, has had to be cancelled/postponed to 2022 March on account of the COVID-19 pandemic.

In order to provide a partial replacement for the full course, an on-line course is being organized, offered over a number of days separated in time. The first slice took place on 2020 November 13, and the second slice will now be offered on two half-days, 2021 March 22 and 23, from 8 am to 11:30 am (Toronto local time).

This on-line offering will have a small number of presentations on the technology of CANDU reactors, on:

- CANDU fuel management and operation
- Detectors for CANDU safe operation,
- Nuclear Steam Supply System (NSSS) and BOP, and
- Reactor and plant control.

The CNS is presenting this course to enhance the professional and technical capabilities of its members (and non-members) working in, or interested in, the nuclear industry. The course is ideally suited for beginning professionals, but also beneficial to experienced professionals. Come broaden your nuclear knowledge beyond your specific area of work and your own area of expertise.

Course Agenda

2021 March 22, Toronto local time (am)

- 08:00 Opening remarks, instructions
- 08:10-9:40 "CANDU Fuel Management and Operation", by Ben Rouben, 12 & 1 Consulting
- 9:40-10:00 Break
- 10:00-11:30 "Detectors for CANDU Safe Operation", by Jingliang Hu, SNC-Lavalin Candu Energy Inc.

2021 March 23, Toronto local time (am)

- 08:00 Introduction, Feedback
- 08:05-9:35 "Nuclear Steam Supply System (NSSS) and BOP", by George Bereznoi, Ontario Tech University
- 9:35-9:50 Break
- 9:50-11:20 "Reactor and Plant Control", by Gilbert Raikums, Terrestrial Energy
- 11:20 Closing remarks

Registration

Please register on-line via the link on the Course web page, which you can reach directly by [clicking here](#) or via the [CNS web site](#).

The registration fees are shown below, and include HST (HST # 87048889RT)

- CNS Member: \$150.00 [Must be a CNS member in good standing]
- Non-CNS Member: \$200.00
- CNS Full-Time Student Member or CNS Retiree Member: \$75.00

CNS SHORT COURSE ON CANDU REACTOR TECHNOLOGY (ON-LINE) – Part 2



Organized by:
The Canadian Nuclear Society
Nuclear Science & Engineering
Division

2021 March 22-23 (Toronto Time,
Mornings Only)

Course held on-line
(Connection details to be
communicated later)

Course contact (not for registration):
B. Rouben, roubenb@alum.mit.edu

For registration questions, contact
Elmir Lekovic, elmir.lekovic@gmail.com

40TH ANNUAL CNS CONFERENCE AND 45TH ANNUAL CNS/CNA STUDENT CONFERENCE (JUNE 6-9, 2021)

For details please visit www.cnc-snc.ca

45TH ANNUAL CNS/CNA STUDENT VIRTUAL CONFERENCE (JUNE 6-9, 2021)

The 45th Annual CNS/CNA Student Conference has extended the student paper submission deadline to March 13, 2021. Students are invited to submit a short (5 pages maximum) paper that will be reviewed by professionals from industry and academia, and if accepted, presented at a Student Poster Session during the conference.

Participating students will receive free registration for the conference and one student from each submission category (Undergraduate, Master's and Ph.D.) will be presented with an award during the conference for exceptional work on both the paper and presented poster.

The free registration will give students access to all (online) events of the conference. It is a great opportunity to hear about the current state of research and development in the nuclear industry and academia, and to meet and interact with fellow students and with professionals in the field.

STORI WORKSHOP: RADIOISOTOPES – SCIENCE, TECHNOLOGY & SAFETY (PROPOSED DATES: LATE MAY – EARLY JUNE 2021)

Topic	Instructor	Hours of Instruction
The Physics of Radionuclide Production	Dorin Nichita	1-2 hours
Radiation-Matter Interactions	Chary	1-2 hours
Radiopharmaceuticals: Production and Applications	Karin Stephanson	1 hour
Infrastructure, factors affecting yields of Radio isotope production	Andrea Armstrong	1 hour
Radio analytical methods to detect radiation emitters in plant effluents and environmental matrices	Yevgenia Kravtsova	1-2 hours
Radiation protection	Chary	1 hour

INTRODUCING THE SOCIETY FOR THE PRESERVATION OF CANADA'S NUCLEAR HERITAGE (SPCNHI)



As members of the CNS, we have an abiding interest in everything nuclear and Canadian. As such, we should be happy to know about and support the Society for the Preservation of Canada's Nuclear Heritage, founded in 2017 in Deep River, Ontario. The Society's goal is to preserve and communicate Canada's Nuclear Heritage, via the collection, safeguarding, and promotion of documents, artefacts, memorabilia, and knowledge associated with the history of the Canadian nuclear industry. SPCNHI is a not-for-profit charitable organization.

You can visit the SPCNHI's website at <https://nuclearheritage.com/> to see the large number of articles, photos, and collections already amassed pertaining to Canada's proud nuclear history.

SPCNHI receives interested members of the public by appointment at its current facility at 51 Poplar St., Deep River. There are plans to eventually host educational programs, workshops, and historical researchers.

The Society Executive is led by:

Michael Stephens, President and Board Chair

James Ungrin, Vice-President and Board Vice-Chair

Morgan Brown, Secretary

Allan Symons, Membership

Consider becoming a member of SPCNHI. The membership fee is only \$20 per year.