

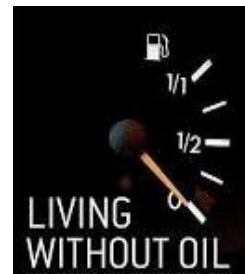


## University of Victoria Retirees Association

# LIVING WITHOUT OIL?

## PART ONE

### AN ELDER ACADEMY EVENT



Is it possible to live without oil? This two-parts series looks at the current state of possible energy replacement technologies. In Part One, the probability of an oil-free future is examined with experts from the University of Victoria Institute for Integrated Systems (IESVic), the Canadian Nuclear Association (CNA), and Ballard Power Systems. They will be discussing hydrogen and fuel cells; SMRS (Small Modular Reactors); wind turbines, and wave supplied power. Part Two, in March 2020, completes the review of available technologies with the help of presenters from BC Hydro and IESVic. The event ends with a panel discussion.



## WHEN, WHERE, HOW MUCH?

**DATES:** Saturdays, February 8, 15, 22, 29, 2020

**TIME:** 10:00am to noon

**WHERE:** University of Victoria, David Turpin Building, Room A110

**COST:** \$20.00 for the four sessions.

**FEB 8: "The Role of Hydrogen and the Fuel Cell in Future Energy Supply",**

**Presenter:** Nicolas Pocard, Ballard

**FEB 15: "Nuclear Revisited – Canadian SMRs (Small Modular Reactors)",**

**Presenter:** John Stewart, CNA

**FEB 22: "Developments in Wind Turbines: Offshore vs Terrestrial",**

**Presenter:** Dr. Curran Crawford, IESVic.

**FEB 29: "Cleaning BC: Wave Supplied Power in a Low-Carbon Energy System"**

**Presenter:** Dr. Brad Buckham, IESVic

## REGISTRATION AND PAYMENT



Registration and credit-card payment done through EventBrite.

<https://www.eventbrite.ca/e/oil-part-one-tickets-85417396733>

**Students attend free but, to secure a space, they must register by emailing [uvraevents@uvic.ca](mailto:uvraevents@uvic.ca)**

**SATURDAY FEBRUARY 8, 2020**

**10:00 am – 12:00pm, David Turpin Building, Room A110**

## **The Role of Hydrogen and the Fuel Cell in Future Energy Transition**

**Presenter:** Nicolas Pocard, MA, Chem. Eng. (ESCOM Paris), MSc, (Ohio State),

Director of Marketing and Business Operations at the Vancouver Corporate Headquarters of Ballard Power Systems.



Nicolas Pocard brings more than 20 years of experience in business development and marketing at the international level. He joined the fuel cell industry in 2004 and Ballard Power Systems in 2012. Among his present responsibilities, Nicolas looks after market strategy, marketing activities, and government relations for Ballard. He is a board member of the California Hydrogen Business Council co-chairing the Public Transit group.

He also represents Ballard with various Industry Associations and Government forums.

*Hydrogen is the single most abundant substance in the universe. Perhaps due to this abundance, we sometimes forget how useful hydrogen is. From being used in the very first internal combustion engines as an inflammable fuel, to powering flight by airships, hydrogen has once again taken center stage in mankind's quest for energy sources in the form of fuel cell applications.*

*This presentation will examine the future role of hydrogen in the decarbonisation of our economy from transportation to industrial sectors. We will look at the current state of the art of fuel cell technology and its current deployments worldwide.*

*Closer to home, hydrogen will be required if Canada and BC are to meet their reduction of emissions targets. The technology developed in the last 30 year in BC's Lower Mainland towards the achievement of these goals, by companies like Ballard Power Systems, will be discussed.*

**SATURDAY FEBRUARY 15, 2020**

**10:00am-12:00pm David Turpin Building, Room A110**

## **Nuclear Re-visited - Canadian SMRs (Small Modular Reactors)**

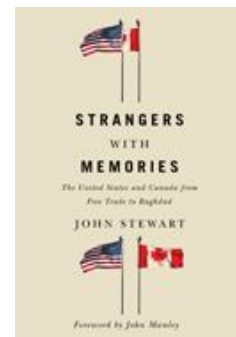
**Presenter:** John Stewart, Canadian Nuclear Association, Director of Policy and Research



John Stewart leads the development of policy and research products to support the CNA's mission, and, he co-chairs the Public Affairs Advisory Committee. He was project manager of the 2018 Small Modular Reactor Roadmap and has been Canada's representative to the Washington-based Global Nexus Initiative.

He worked with the U.S. Embassy in Ottawa from 1990 to 2010, where he was a member of a Climate Outreach Team that in 2006 received a Superior Honor Award for effectively communicating U.S. foreign policy on the environment and climate change. An advocate for the productive integration of immigrants into Canadian society, he has led two of Ottawa's immigrant services organizations.

John is on the teaching faculty of the Max Bell School of Public Policy at McGill University and is the author of *Strangers with Memories: The United States and Canada from Free Trade to Baghdad* (McGill-Queen's University Press, 2017).



*As project manager of CNA's 2018 Small Modular Reactor Roadmap, John Stewart's lecture discussing Nuclear Re-visited - Canadian SMRs (Small Modular Reactors) will cover the following points:*

- ✓ *The pathway to a decarbonized energy system*
- ✓ *How much electrification that would require*
- ✓ *How much growth in clean electricity capacity that would require*
- ✓ *How much of that capacity can be provided by renewables*
- ✓ *Why 20 years of investment in renewables is not producing transformative change*
- ✓ *How we fix this – with reference to the International Energy Agency's data and analysis*

**SATURDAY FEBRUARY 22, 2020**

**10:00am – 12:00pm, David Turpin Building, Room A110**

**Wind Energy Opportunities:**

**Terrestrial, offshore and airborne variants**

**Presenter: Dr. Curran Crawford** BEng (UVic), SM (MIT); PhD (Cambridge University, UK), PEng



Dr. Curran Crawford is a Professor in Mechanical Engineering at the University of Victoria, a member of the Institute for Integrated Energy Systems (IESVic), and, he co-directs the Pacific Institute for Marine Energy Discovery (PRIMED). His MSc and PhD work at MIT and Cambridge University respectively focused on the multidisciplinary optimization of wind turbines. His research group currently focuses on developing advanced stochastic, multi-fidelity and multidisciplinary models and optimization-based design tools for a range of low-carbon technologies ranging from advanced wind energy concepts, to tidal and wave energy, through to energy systems analysis of electrified transportation, batteries and demand response. The high-level

objective of this research has enabled a transition to a low-carbon future by connecting renewable generation with end-use services. He is a registered Professional Engineering in BC, and serves on various regional, national and international panels, committees and projects in wind energy systems and electrified transportation.

*Wind energy has emerged as a key low-carbon electricity generation technology through progressive development starting in earnest in the 1970's. Wind resources are widely distributed around the world, and, in some energy markets, are now on-par with conventional fossil fuel generation prices.*

*The talk will open with an overview of the characteristics of the wind resource and international electricity market features relative to the integration of wind energy. We will then explore the engineering drivers that have led to the emergence of the 'Danish concept' 3-bladed wind turbine, in contrast to vertical axis and ducted rotor configurations that have been less successful. Aspects of terrestrial wind energy deployments will be presented, including siting considerations and both global and systemic environmental impacts. Emerging technology developments will then be discussed, starting with bottom-mounted offshore turbines, continued machine upscaling past 10 MW, and the push toward floating offshore concepts. Finally, the promises and challenges of airborne wind energy will be presented.*

**SATURDAY FEBRUARY 29 2020**

**10:00am-12:00pm, David Turpin Building, Room A110**

**Cleaning BC:**

**The role of Wave Supplied Power in a Low-Carbon Energy System**

**Presenter:** Dr. Brad Buckham PhD (UVic), PEng: Professor Dept Mech Eng. UVic.

Recipient of the 2018 “Excellence in Teaching” award from the Engineers and Geoscientists of BC and Engineers Canada.



Dr. Brad Buckham is a Professor in the Department of Mechanical Engineering and a member of the Institute for Integrated Energy Systems at the University of Victoria. He specializes in offshore mechanics and directs the West Coast Wave Initiative (WCWI) and co-directs the Pacific Regional Institute for Marine Energy Discovery (PRIMED).

WCWI research is graduate student driven and focusses on wave energy resource assessment, wave energy converter technology optimization, and performance assessment, and development of GIS based methods for identifying BC’s strategic wave energy sites.

PRIMED is focused on assisting BC coastal communities and marine energy technology developers in identifying and planning mutually beneficial marine energy demonstration projects.

Dr. Buckham’s contributions to research and training in the marine renewables sector have been recognized by the BC Innovation Council, Natural Resources Canada and Mitacs Canada.

He is an Associate Editor of the Journal of Oceanic Engineering and member of the Board of Directors for Marine Renewables Canada.

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*Within our portfolio of renewable energy technologies, wave energy converters (WECs) suffer a unique dichotomy: wave energy is accepted as a vast untapped natural energy supply with some competitive advantages, but wave energy converters remain a nascent technology and are subject to disdain when viewed side-by-side with land based renewable options like solar and wind.*

*British Columbia is a pertinent case study in wave energy development – the region is rich in its wave energy resource, but the development of that resource is held down by a saturated energy market, and strict cost-of-energy constraints that apply to any new generation capacity. However, off of the main utility grid in BC there are a large number of communities that remain reliant on diesel fueled energy generation and there is a very strong push at all levels of government to mitigate diesel consumption at these locations. For many of these communities, wave supplied power is the locally predominant renewable supply and presents the best opportunity to eliminate diesel consumption – provided technology can be operated without undue risk.*

*Through the course of this presentation, recent developments in WEC design and control, the state of new international standards for the WEC industry and how these efforts can serve BC communities will be described. Case studies will be used to show how BC's ocean waves can serve the province's decarbonization effort and what levels of investment are going to be needed to realize first of a kind deployments.*

## **USEFUL INFORMATION**

**PARKING:** On Saturday parking is \$3.50 for all day. Cash or Credit Card. New parking regulations require you to enter your license plate number when purchasing your ticket. You do not have to return to your car to place the ticket on the dash as it is all done electronically.

**SUGGESTED PARKING:** Lot 6 at McGill Road and Ring Road

**CAMPUS MAP:** [www.uvic.ca/home/about/campus-info/maps/pdf/parking-map.pdf](http://www.uvic.ca/home/about/campus-info/maps/pdf/parking-map.pdf)

**BUS ROUTES:** [www.uvic.ca/home/about/campus-info/maps/maps/](http://www.uvic.ca/home/about/campus-info/maps/maps/)

**NEED HELP?** Please contact: [http://uvra@uvic.ca](mailto:http://uvra@uvic.ca)