



WINTER - SPRING 2017

Tackling decarbonisation

Sybil Seitzinger, PICS executive director



“Clean up the grid, and electrify everything.” This deceptively simple – but useful – description sums up what is needed to achieve the bulk of the deep decarbonisation of our economy and to meet our ambitious international and domestic greenhouse gas (GHG) emissions reductions targets.

Roughly two-thirds of global GHGs come from the combustion of fossil fuels for electricity, heating, transport and industry. The remaining third comes from sources including agriculture, land-use change, waste, and from chemical reactions in cement and steel manufacturing.

The switching of fossil fuels for new or existing clean sources of energy will be a mammoth task, as I explained during two Connect U talks at the University of Victoria this May.

While on the face of it we seem to have a host of existing technologies at our disposal – for example wind, solar, geothermal, hydropower, and nuclear – each option comes with its own challenges and limitations. These include issues of intermittency and therefore reliability, energy storage, scalability, land-use change, hazardous waste disposal, social licence, accessibility, and cost. Unfortunately there is no single silver bullet.

This spring, PICS released a glossy report entitled [Wave Energy: A Primer for British Columbia](#) that explores the feasibility of harnessing electrical energy off BC’s wild west coast. Co-authored by researchers at UVic’s West Coast Wave Initiative (WCWI), the primer summarises their findings about the magnitude of BC’s wave energy potential, explains how wave energy converters work, and examines the opportunities and challenges of this fledgling sector.

The researchers now for the first time have sufficient data about ideal BC coast locations to start testing wave energy converters in the water, with the initial beneficiaries tipped to be remote coastal First Nations communities currently energy dependent on diesel. The long-term goal? For wave energy to make the same technological and cost-efficiency gains that solar and wind have in the past decade in order to become a meaningful contributor to the electrical grid.

There is no doubt that the wave industry has a long way to go to achieve this moonshot. But as the world shifts to electrify transport and other sectors, and electricity demand ramps up, so does the importance

of investigating the full range of non-emitting energy sources.

Let’s consider it from an energy perspective. Even British Columbia, with its hydroelectricity resources that supply 97 percent of its electricity needs, is under pressure to diversify its energy mix. That’s because nearly two thirds of the energy used in BC comes from fossil fuels (transport, heating, cooling and industry), with electricity being the minor player.

BC, and indeed Canada, has each set long-term GHG reduction targets of 80 percent below 2007 and 2005 levels respectively. Therefore the future energy landscape needs to look vastly different by 2050 than it does today. All coal, oil and gas-fired power plants have to be replaced with something that doesn’t emit greenhouse gases. And all of transport, heating/cooling and industry has to be electrified.

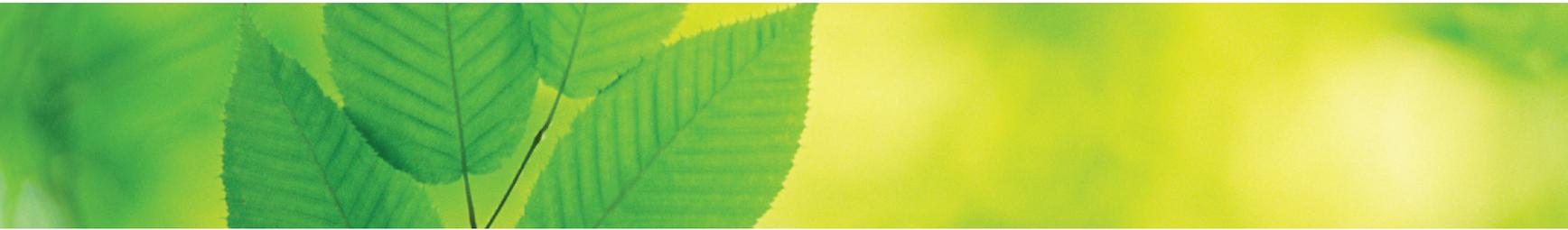
To meet those targets, energy forecasters estimate that demand for electricity will double in BC, while Canada will need a two-to-four fold increase in supply. Furthermore, research analysed by the [PICS 2060 Project](#) shows that BC has been a net importer of electricity for five of the past 10 years, and had a net electricity balance close to zero between 2005 and 2015. There is no “extra fat” in the system.

Clearly, new clean energy sources are needed, as BC, Canada and indeed the world grapples with this challenge.

As a policy-neutral, technology-neutral organisation, PICS has supported research into a range of potential clean energy sources—including wave, high-altitude kite energy, floating offshore wind and geothermal—as well research into improving or cleaning up existing technologies including solar, wind, nuclear, and oil and gas production.

Forestry too can play its part. The PICS Forest Management Project will host a [public event](#) in late May to showcase its findings on how this sector boosts carbon mitigation through different management approaches, and greater substitution of manufactured wood products for carbon-intensive concrete and steel.

Ensuring that PICS can be more responsive in providing timely, evidence-based policy-options—on issues such as decarbonisation—is part of the current strategic review of the institute. I want to thank the invaluable contribution of the dedicated taskforce spearheading this process, which met three times this winter/spring, and identified three strategic areas in the new “PICS way” – conducting collaborative research, enhancing organizational development, and communicating climate change solutions. By late summer I look forward to releasing the final PICS Strategic Plan.



It's time to get a WEC in the water

British Columbia now has enough detailed information about the height, frequency and direction of its coastal waves to start developing and testing wave energy converters (WECS) in the ocean, according to a new PICS report released in late April.

Co-authored by researchers at UVic's West Coast Wave Initiative (WCWI), [Wave Energy: A Primer for British Columbia](#) summarises years of data on the magnitude of BC's wave energy potential, explains how wave energy converters work, and examines the opportunities and challenges of the sector.

Waves are a highly predictable resource for power system managers compared to other variable renewable energy sources. The [WCWI](#) has found, on average, a four-hour wave forecast is reliable within a 15 percent margin of error, while wind and



Wave energy primer lead author Bryson Robertson says there is now enough detailed information about BC's energetic wave resource to start testing WECS locally.

solar in the Pacific Northwest are closer to 77 percent and 86 percent respectively. Another is seasonal timing, whereby the biggest (and most energetic) waves occur in winter, coinciding with times when local energy demand is highest.

Researchers see the initial beneficiaries being remote and/or First Nations communities currently dependent on

diesel. Longer term, once greater energy efficiencies are gained, wave energy could be part of a suite of renewable energy sources for BC. The primer covers other next-step industry challenges, including the high per-unit cost of energy compared to other renewables, biofouling, gaining social license, and operating in a hostile ocean environment.

The Primer attracted considerable media attention, with coverage by Global News BC, Chek TV news, Metro Vancouver magazine, industry press plus BC radio stations.

Clean Growth and the BC Election

The three major political parties contesting this year's BC Election squared off on climate-related issues in a special webinar hosted on April 20 by PICS, the Pembina Institute and Clean Energy BC.

Candidates Mary Polak from the BC Liberal Party (Langley), George Heyman of the BC NDP (Vancouver-Fairview), and Andrew Weaver from the BC Green Party (Oak Bay-Gordon Head) fielded questions from panellists on clean energy and climate actions.

[A recording](#) of the event is available on the PICS event calendar.



Candidates: (top L-R) George Heyman, Mary Polak, and (lower L-R) Andrew Weaver, with moderator Josha MacNab (Pembina Institute)

Questions from the panel covered the issues of preparing for climate change in BC, clean energy opportunities for First Nations, energy efficient housing, and reducing carbon pollution.

Urban Resilience Strategies in Metro Vancouver

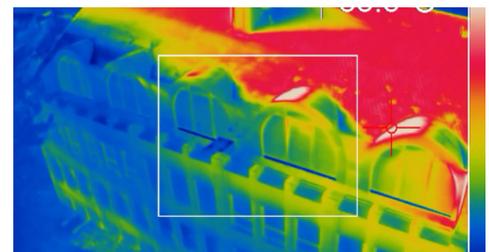
Severe flooding has affected the homes of many Canadians living in parts of Quebec, Ottawa and southern interior British Columbia this spring, reinforcing the importance of urban strategies that plan for the increased likelihood of such events. In March PICS sponsored the first of two-day international [Resilient Cities](#) workshops hosted by SFU Urban Studies and Germany's Technical University (TU) of Dortmund. Meg Holden, a PICS program committee member from SFU, alongside TU's Robin Chang and Nadine Maegdefrau, led the event.

The workshop enabled scholars, students and professionals from the municipalities of Vancouver, Surrey and Richmond to share lessons and strategies on resilient city planning and flood protection with each other and their German colleagues. A PICS-sponsored evening public talk entitled [Resiliency and YOU in a climate unsteady future](#) is available to watch on the PICS website.

Part of the event included a field exchange visit from TU-Dortmund students investigating urban climate resilience planning. A similar learning opportunity will take place this June when SFU students visit German cities in the Ruhr region. Summary reports of the two international workshops will be prepared by late fall.

How thermal imaging can inspire home retrofits

The City of Vancouver and other municipalities are using thermal imaging (TI) as part of a community-based approach to encourage homeowners to energy retrofit their homes – a move that is supported by research published this winter in a new PICS white paper.



Thermal imaging by drone. Image credit: Optris.

The report, [Motivating communities to retrofit their homes: The potential of thermal imaging in BC](#), has been produced by researchers at the Collaborative for Advanced Landscape Planning at the University of British Columbia (UBC) in partnership with PICS.

A key finding is that being able to see where heat is escaping from your own home is a powerful—and underutilized—way to encourage home energy retrofits, especially when infrared images are packaged with incentives and promoted within your community.

One example in the report is the West Vancouver Eagle Island initiative, where 26 of the 31 homeowners retrofitted their houses after receiving a TI energy audit along with financial rebates. The average carbon footprint of the retrofitted homes dropped from 5 tonnes of carbon dioxide per year to 1.7 tonnes of CO₂ as a result.

Lead researcher Lisa Westerhoff says the UBC team passed along its research to the City of Vancouver, which has now launched its own new neighbourhood level TI program for homeowners. Other lower mainland communities are also trying it out.

The report offers 30 specific recommendations for how government, utilities, researchers and neighbourhood groups can better utilize TI technology as part of housing retrofit outreach programs.

Canadian climate change stories hitting the airwaves

The PICS-supported radio and podcast show [Cited](#), which partners researchers with journalists to produce documentaries, is expanding its outreach with new outlets airing their climate change stories this summer. PICS program committee member

Stephen Shepard was interviewed by Cited in an episode on [sea level rise](#). The podcast has received nearly 100,000 downloads to date, has played on five radio stations, and featured on the front page of [Stitcher](#). Cited will continue to work with PICS UBC and researchers to further develop this story—including the impact of sea level rise on communities such as Finn Slough in Richmond—which will air this



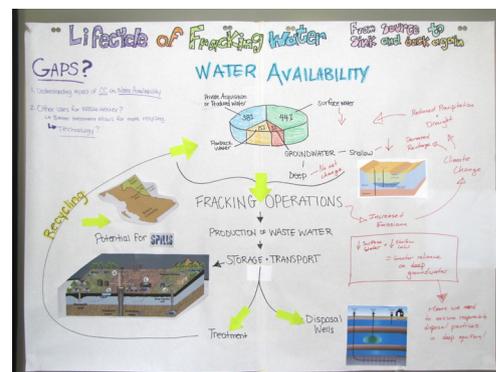
Sybil Seitzinger, PICS exec director, being interviewed by CBC's Johanna Wagstaffe for a new podcast series on climate change

summer on [CBC's Doc Project](#).

Also, stay tuned for a new CBC summer podcast series on climate change starting June 9, that includes insight from PICS director Sybil Seitzinger's interview with CBC meteorologist Johanna Wagstaffe.

Exploring the Climate, Water, and Energy Nexus

Finding new research opportunities for SFU teams working within energy, water and climate change related disciplines was the goal of the second [SFU Climate and Energy Research Day](#) co-hosted by SFU and PICS on April 27.



The winning “jam session” poster—“Life Cycle of Fracking Water”

Keynote speakers—**Jonathan Wilkinson**, Parliamentary Secretary to the Minister of the Environment and Climate Change, **Andrea Reimer**, City of Vancouver and **Stephanie Smith**, BC Hydro—highlighted the research gaps in their respective areas. This was followed by a panel session with Reimer and Smith, and SFU researchers, Jonn Axen (REM), Diana Allen (Earth Sciences), and Anil Hira (Political Science).

Students and faculty members also shared their research via a climate change poster session. This was followed by a “jam session” where researchers were challenged to build a new synthesis poster based on their original design. The winning entry – “Life Cycle of Fracking Water: From source to sink and back again” – was awarded to Matthew Simons, Teresa Rosales, and Samantha Morgan, who are part of the [PICS Natural Gas project](#).

A video recording of the morning session, abstract book and posters are available at the [PICS SFU website](#).

PICS Fellows going public – glaciers, economics and adaptation

[PICS UNBC fellow Ben Pelto](#) inspired fascination in his Prince George community about glacier change and water impacts in the community with presentations to local students and local Rotarians. Ben is a PhD candidate researching the magnitude and timing of glacier runoff to the Columbia River Basin.

Grade 5 and 6 Nusdeh Yoh Elementary students learned how glaciers moved and how salmon and other wildlife benefit from the seasonal flushes of water that glaciers provide to streams and rivers in northern BC. Students made “glacier goo” in order to see how the slow-moving masses of ice travel across bedrock, and experienced a



Above: Making “glacier goo” with students at Nusdeh Yoh Elementary. Below: A home-made “ice core” with students at Nusdeh Yoh Elementary.





Stefan Pauer (R) has been sharing his research.

home-made “ice-core”, demonstrating one of the ways Ben gathers data in the field and what he can see when he examines these frozen time capsules. Ben’s day at the Central Interior Science Exhibition meant that several hundred youth learned how glaciology research is carried out, including the instruments used by researchers.

PICS UBC Fellows have also been sharing their research findings with the wider community this spring through a series of public talks and workshops. [Stefan Pauer](#) and [Tugce Conger](#) presented on very different subjects – carbon tariffs, and community preparation for sea level rise – at the PhDs Go Public talk series in Vancouver in March.

Stefan also shared his insights on carbon pricing and complementary climate policies during a UBC Sustainability Ambassadors public panel in March. This was followed by a European workshop and presentation at the University Alliance for Sustainability climate policy conference in Berlin. There his talk focused on an aviation sector case study of the European Union’s cap-and-trade system. Stefan says the inclusion of international flights in that system offers a rare example of a domestic climate policy that is akin to a border tax adjustment.



Dr Seitzinger with Dr. Kris Ebi

In case you missed it...

Many PICS hosted or supported public events are recorded and are accessible via our website [Events Archive](#). Check out the range of talks hosted by leading climate experts this past winter/spring, including lectures by:

[Kristie Ebi](#) on how communities should prepare for the risks to human health caused by climate change. Dr. Ebi is director of the

Center for Health and the Global Environment, and Professor, at the University of Washington. Feb 2, 2017.

[James Syvitski](#) on the impact of human activities on the Earth and the debate over whether, as a result, we have entered a new geological age, the Anthropocene. Dr. Syvitski is executive director of the Community Surface Dynamics Modeling System, and a professor at the University of Colorado. March 28, 2017.

Coming up...

Managing BC’s forest sector to mitigate climate change

Learn how different strategies can alter the carbon uptake and climate change mitigation potential of the BC forestry sector; the likely impacts of climate change on BC’s forests; and how policy makers can align forest and wood product management practices with British Columbians’ values. Join this free public event hosted by the PICS Forest Carbon Management Project on Thursday May 25, 2017. [Full details on the PICS event page.](#)



The Octopus’s Garden? Planning for Sea Level Rise

The PICS co-hosted [Octopus’s Garden series](#) will run from June-November 2017, featuring experts on sea level rise. Topics to be addressed include the science behind sea level rise, climate refugees, traditional knowledge and indigenous responses to sea

level rise, what to expect globally - and how we can prepare locally. PICS in partnership with several SFU organisations, the City of Vancouver and the Vancouver Aquarium will launch the series on June 8th at 7pm at the aquarium’s Marine Science Centre. For details visit the PICS website.

Canada’s climate change moonshot: BC-made solutions and clean-tech breakthroughs

Join PICS for this free public panel discussion featuring leading clean-tech entrepreneurs, researchers and policy-makers, in downtown Vancouver at 7pm on June 15. Moderated by Vancouver Sun political columnist, Vaughn Palmer, the panel will discuss BC’s role in the cleantech revolution, and outline some of the coolest tech projects happening in this province. Please [register for a seat on the PICS website.](#)

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