



Pacific Institute  
for Climate Solutions  
Knowledge. Insight. Action.

# ANNUAL REPORT 2014





The Pacific Institute for Climate Solutions gratefully acknowledges the generous endowment provided by the Province of British Columbia through the Ministry of Environment in 2008. This funding is enabling ongoing independent research aimed at developing innovative climate change solutions, opportunities for adaptation, and steps toward achieving a vibrant low carbon economy.

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## MESSAGE FROM THE EXECUTIVE DIRECTOR



January 2015 saw the Japan Meteorological Agency and NASA and NOAA in the United States report that 2014 was Earth's warmest year since modern-day record-keeping began in 1880. While the announcement was not

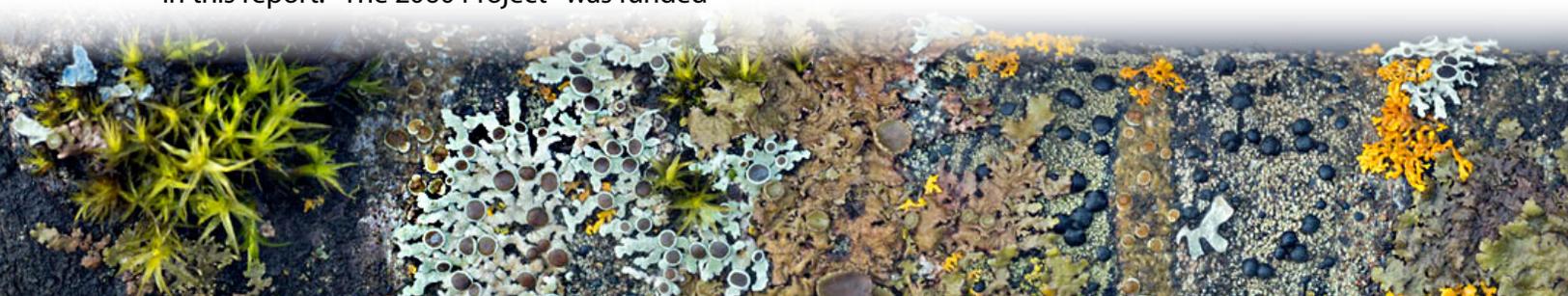
a surprise, the climatic context was: unlike 1998, another record-setter for global annual temperature, 2014 was not an El Niño year when warm water across the eastern equatorial Pacific region releases large amounts of heat and warms the global atmosphere. Rather, the warming of 2014 continues the long-term rise in global average temperature that will almost certainly persist for decades to come.

How societies around the globe respond to that trend remains the major challenge of our time, and it reinforces the importance of the solutions-based approach on which PICS focuses in its work. However solutions aren't just to be found in reducing greenhouse gas (GHG) emissions, as compelling as that obligation is. They must also address the obligation to adapt to the climate changes that are very clearly upon us.

2014 was an important year for PICS in meeting that dual adaptation-mitigation challenge. We made great strides toward completing the restructuring of our research effort, which is focusing on just five large projects as described in this report. "The 2060 Project" was funded

in January, and uses multidisciplinary and sophisticated modeling approaches to explore enhanced accommodation of renewable electricity generation sources into the western Canadian electrical grid, the objective being to quantify reductions in GHG emissions via grid integration. In April, we funded "Carbon Management in BC's Forests", an intensive interdisciplinary study that will work to answer a simple question: How can we maximize uptake of carbon into BC's forests while continuing to realize economic value? In July we funded "Natural Gas: Maximizing the Value for British Columbia" which defines "value" not just in economic terms but rather in the context of environmental, social, cultural and economic returns to the province. At the end of the year, we announced that funding for a fourth project, "Energy Efficiency in the Built Sector in BC" would be made available early in 2015. That project is again multidisciplinary and will conduct research that marries not just provisions for better design, construction, energy use and livability in our buildings, but also the roles that careful urban design and infrastructure planning can play in reducing emissions from British Columbia's built environment.

The groundwork for our fifth major project, "Transportation Futures for BC" was laid in 2014 and will be funded in the coming months. That program will explore solutions-based approaches that can contribute to reducing the 23 million tonnes/year of greenhouse gases emitted by the personal and industrial transportation sectors in the province. All five of these major projects



include or will include full economic analyses as well as consideration of social responses and impacts and implications for societal and physical adaptation. And recognizing that the scale of the key questions in each case is demanding, all five projects are expected to be funded for five years, and potentially longer.

While we were building our new research agenda in 2014, we wrapped up other initiatives. The PICS Phase 1 research program that commenced in late 2009 was completed at the end of the 2013-2014 fiscal year. During its tenure, that program supported an array of over three dozen research projects that spanned a broad spectrum from human behavioral responses to the climate-change challenge, through ecological resilience to technology development and carbon-pricing economics. On the communications front, PICS completed and released in October the final free, animated online short course—on Adaptation—in the Climate Insights 101 trifecta. That award-winning series has attracted hundreds of thousands of viewers in well over 170 countries and remains a flagship product for us.

We had continued success in 2014 with our public lectures series: PICS hosted or co-sponsored 41 separate seminar or lecture events, most of which were live webcast and can be viewed in the events archive on our website. Our graduate and postdoctoral fellows continue to impress, conducting and publishing quality research across a remarkably broad array of disciplines, from engineering through political science, economics, and sociology. Our research output continues to grow via multiple channels including academic journal publications and our

increasingly popular White Papers series. PICS White Papers have now been downloaded nearly 35,000 times and every release attracts substantial media attention.

But with past success comes higher expectations. After six full years of activity, the PICS research community will continue to provide the knowledge and insights that British Columbia needs as it strives to find mitigation solutions while adapting. Meeting that dual obligation is a complex challenge deeply rooted in human behavioural responses, environmental concerns, and politics at all scales from the local to the international. The Institute will continue to work on the scholarly dimensions of those many fronts while simultaneously communicating their importance, for British Columbians deserve no less.

Let me end on a personal note. I anticipate that this will be the last Executive Director's message I contribute, for I intend to step down from PICS in mid-2015 to return to the School of Earth and Ocean Sciences. It has been an honour and a true privilege to serve the Institute for the last several years. And it has been particularly gratifying to have had the opportunity to work with so many exceptional colleagues in the PICS UVic office and beyond at our consortium university campuses. I am deeply grateful to you all.

*Tom Pedersen*



## ABOUT PICS

The Pacific Institute for Climate Solutions (PICS) is a dynamic knowledge network that brings together leading researchers from British Columbia (BC) and around the world to study the impacts of climate change and to develop positive approaches to mitigation and adaptation.

Created in 2008 with a major endowment from the BC Ministry of the Environment, PICS is hosted and led by the University of Victoria (UVic) in collaboration with BC's three other research-intensive universities – Simon Fraser University (SFU), the University of British Columbia (UBC) and the University of Northern British Columbia (UNBC).

As such, PICS pulls together the intellectual capital of the province in applying a multi-disciplinary approach to climate change research. In partnership with all levels of government, the private and the non-profit sector, we strive to develop innovative climate change solutions that will help lead the way to a vibrant, low-carbon economy.

The Institute's main objectives are:

- understanding the magnitude and patterns of climate change and its impacts;
- evaluating the physical, economic and social implications;

- assessing mitigation and adaptation options and developing policy and business solutions;
- evaluating and strengthening educational and capacity-building strategies to address climate change; and
- communicating climate change issues to government, industry and the general public.

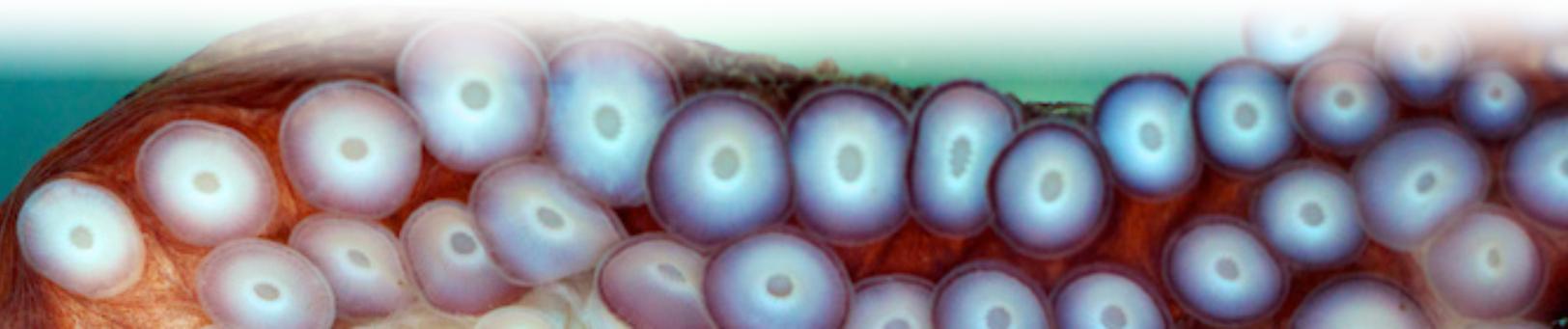
## Mission Statement

To partner with governments, the private sector, other researchers and civil society, in order to undertake research on, monitor, and assess the potential impacts of climate change and to assess, develop and promote viable mitigation and adaptation options to better inform climate change policies and actions.

## Governance

PICS is governed by a Program Committee consisting of researchers from the four partner universities as well as representatives from the provincial Climate Action Secretariat (CAS) and Environment Canada's Canadian Centre for Climate Modelling and Analysis (CCCMA); an Executive Committee appointed by the University of Victoria; and an external Advisory Board comprising representatives from across the public, private and non-profit sector.

More information about the PICS governance structure is included as Appendix 1.



## RESEARCH

Collaborative and interdisciplinary research dedicated to meeting the multi-faceted climate-change challenge is at the core of the PICS mandate. The Institute supports a very broad research effort, working directly with between 70 and 100 researchers in any given year. Current initiatives include five major projects of direct relevance to BC's policy environment, several dozen graduate and post-doctoral fellowships and 12 annual employment internships. PICS also commissions leading edge research from academics and experts from within BC and elsewhere.

Research results form the basis for PICS white papers, briefing notes, scholarly journal articles and book chapters, as well as public outreach events, and contributions to outside research initiatives. Primary users of this work include policy-makers, educators, the research community, media and the interested public.

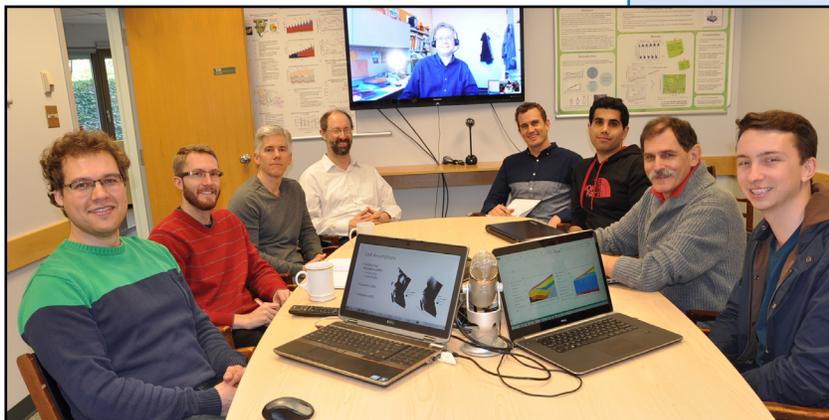
In 2014 PICS invested more than \$1.6 million in direct applied research. 2014 also marked the launch of **Phase II of the Strategic Research Plan**. Project descriptions follow.

### Electrical grid integration

#### A Phase II project

In January 2014 PICS announced its \$1.5-million **2060 Project: Energy Pathways for British Columbia and Canada**, that will examine the potential for expanded electrical grid interconnections between British Columbia and Alberta, taking into account the expected impact of climate change on future hydrology supplies 50 years from now. Future work will investigate the impact of large-scale energy systems across Canada under various carbon policies and global growth scenarios, as well as greater integration into the Western Interconnect.

Project leader Andrew Rowe from UVic's Faculty of Engineering says inter-connecting regional electricity grids may reduce GHG emissions if one region with abundant "clean" renewable energy can displace a heavy emitter (such as coal-fired electricity) in a neighbouring jurisdiction. "Our research is expected to illuminate how further grid integration will influence costs, reliability and emissions from a more connected region." Integration is also seen as a way to bring more renewable energy sources into the grid. Institutions involved in the project include UVic, BC Institute of Technology (BCIT), BC Hydro, Climate Action Secretariat, Alberta Energy, Ministry of Energy, and market surveillance specialists.



The 2060 Project team (L-R): Kevin Palmer-Wilson, Ben Lyseng, Andrew Rowe, David Chassin, Bryson Robertson; Iman Moazzen, Lawrence Pitt; Jeff English. On the big screen via Skype: Taco Niet at BCIT. Missing from photo: Ned Djilali and Peter Wild.

## Phase II Strategic Research Plan: Major Projects

Phase II is based on a more policy-focused approach to research. It currently includes five new major projects to be conducted over the next five years, subject to meeting interim progress targets. The new structure brings interdisciplinary and inter-institutional teams together to conduct research on issues of critical importance to British Columbia in the context of the climate-change challenge. The new projects are:

- The 2060 Project: Integrated Energy System Pathways for BC and Canada
- Natural Gas Development and Maximizing Net Social Benefits to BC
- Transportation Futures for BC
- Energy Efficiency in the Built Environment
- Forest Carbon Management in BC

Project teams consist of experts from within academia, the provincial and federal governments, industry, and First Nations, with allocated funding support for graduate students, post-doctoral fellows, and face-to-face team meetings. An Advisory Panel offers advice for each project. Panel members include the PICS Executive Director or designate, a member of the Climate Action Secretariat and at least one external academic researcher and minimum one member of the business community.

### Forest carbon management in BC

#### A Phase II project

Perhaps unsurprisingly, the July 2014 announcement of a major new PICS research project to help BC's forestry sector better adapt to and mitigate climate change, generated considerable interest in the province where one in five jobs is related to forests. The five-year, \$1.5-million

#### Forest Carbon Management Project

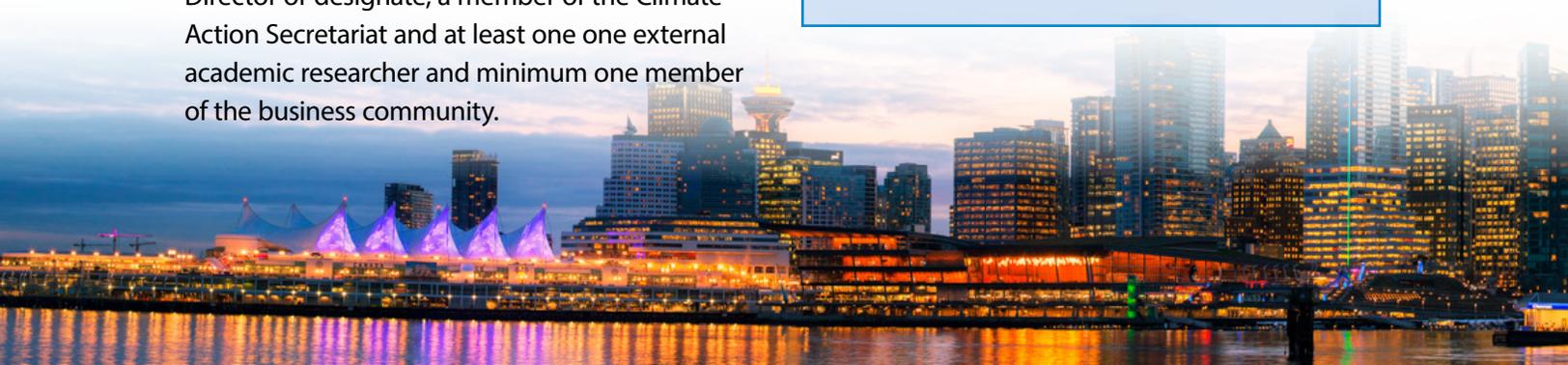
headed by Werner Kurz, a senior research scientist with Natural Resources Canada, brings together climate, forestry, and socio-economic policy experts from academia, government, industry, and First Nations.

Their goal? To design a roadmap to help managers safeguard forests in the face of climate change, while maximizing the

potential of our forests to capture and store carbon – both in the living forest and soil-based carbon sinks, and in timber products such as furniture and buildings. The project will also identify opportunities to substitute timber products for carbon-intensive products. Results are expected from March 2016 onwards.



Werner Kurz, leader of the PICS Forest Carbon Management Project, checks out some longterm carbon storage (i.e. the Kinsol Trestle, on Vancouver Island)



## Phase I Strategic Research Plan: Projects

Phase I of the PICS Strategic Research Plan was officially 'retired' on March 31, 2014. Within this framework, between 2009 and 2014 PICS has supported a wide range of solutions-focused research relevant to BC under five themes:

- The low carbon emissions economy
- Social mobilization
- Sustainable communities
- Resilient ecosystems
- Carbon management in BC forests

Initial calls for applied research applications under each of these themes were issued in 2010/11 and a total of \$2.7 million over two years was allocated to 34 projects, all of which were completed in 2014.

Project details are published in the Research section of the PICS website. Brief descriptions of a limited sample of projects conducted under the Phase I program follow.

### The Low Carbon Emissions Economy

This theme engaged research that capitalized on the opportunities and policy initiatives required to build such a vibrant and diverse low-carbon economy.

Projects undertaken include optimizing wind turbine design and location in BC; advancing BC's carbon tax; accelerating GHG reductions in the BC economy; designing employment frameworks that support a shift to a low-carbon economy; and developing zero waste

policies to manage solid waste and reduce GHG emissions.

### Sustainable Communities

This theme promoted research designed to foster sustainable communities in BC— from the way we structure our built environment and organisations, through to how the beliefs and behaviors of leaders and citizens influence the collective use of energy and materials.

Research projects included developing a user-friendly computer model to assist local governments with their energy and emissions reduction planning; exploring the elements of a sustainable community, including densification and mixed land use; and designing sustainability planning processes specifically for rural communities.

### Resilient Ecosystems

Research under this theme sought to understand the scale, pace and range of climate change impacts on BC's ecosystems and to develop management solutions to maintain their viability.

Projects included assessing the potential impact of climate change on fish habitat in BC streams; evaluating the resilience of northern interior ancient cedar-hemlock forests to specific pest outbreaks; using ring tree analysis to determine the role of diminishing snowpacks and late-winter freezes on the decline of west coast yellow cedar; and protecting the biodiversity of BC's threatened alpine habitat.



### Carbon Management in BC Forests

Forest-based carbon stocks will be affected by pests, fire, drought and other climate change factors, as well as by human activities such as land use changes and harvesting. This theme sought to understand and address these impacts on BC's forest ecosystems as well as the related socio-economic implications.

Published reports include using waste-wood from fire-prevention clearance work to fuel district heating systems in rural areas; estimating the carbon storage and emissions from BC's harvested wood products; and assessing how mountain pine beetle-affected wood can be used to optimize BC's bioenergy mix and support future forest carbon stores.

### Social Mobilization

Through its first round of funded research themes, PICS delivered a unique cluster of applied research projects on social mobilization around climate solutions, with a particular focus on: resolving social barriers to clean energy solutions; methods for evaluating social mobilization effectiveness; improving understanding of the impact of digital media; and developing new digital media/tools to engage the 'silent majority'. These research projects were focused on real and lasting changes in the ways British Columbians live, work and think, which is crucial in mitigating and adapting to climate change.

The Collaborative for Advanced Landscape Planning (CALP) at UBC is

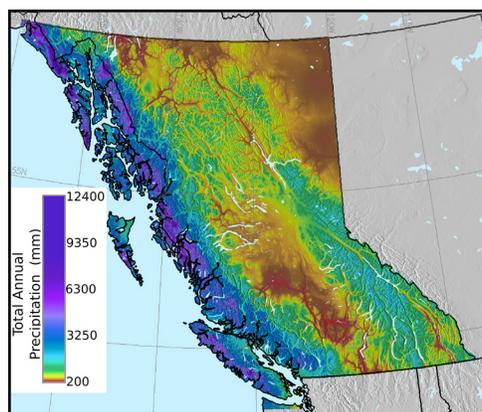
currently preparing a synthesis white paper on these social mobilization projects. The white paper attempts to inform the reader of "what works" and "what doesn't work" in identifying, developing, and executing effective social mobilization solutions on climate change. With many communities struggling to meet their GHG emission reduction targets, these findings should inform BC's future course on accelerating climate action. The key findings address recommendations on: the importance of multiple pathways for social engagement; replicating proven successes in expanding public input and achieving behavioural change with appropriate use of social and visual media; the need for collective problem solving at neighbourhood scales; and for consistent governmental support in mutually reinforcing grassroots processes. The white paper will be released in Spring, 2015.

### Affiliated Projects

PICS supports climate-related research projects outside the scope of the five major themes. For example:

- The PRISM climate-mapping project provides climatological data ranging in scope from the back yard to the

BC province-wide scale. This tells users about the long-term average climate for their region. Further efforts will provide a geographically detailed history of monthly conditions in BC.



An example of the highly detailed climate maps generated through the PICS-supported PRISM project.

## Cleaning up oil & gas industry waste

PICS Fellowship holder Saad Dara is part of the UBC team that has been awarded \$500,000 from the Climate Change and Emissions Management Corporation (CCEMC) for developing technology that converts on-site waste materials from oil and gas production into high-value chemicals and desalinated water, for reuse by that industry. The project led by former PICS Program Committee member, Prof. David Wilkinson, was one of 24 finalists chosen from over 344 international submissions.

The technology combines the salts present in industrial wastewater with waste carbon dioxide (CO<sub>2</sub>) in an electrochemical cell. This mineralizes the CO<sub>2</sub>, creating high-value chemicals such as acids and carbonate salts. In the process the wastewater is desalinated, and can be reused by industry, rather than disposed of.

Saad said that flaring during natural gas extraction could be a feedstock of CO<sub>2</sub> for this electro dialysis process, rather than having it vent to the atmosphere. "The overall result would be a small carbon footprint and an economical alternative to conventional desalination techniques." Wide-scale adoption of the technology in Alberta's oil and gas industry could potentially remove some 3.5 megatonnes of CO<sub>2</sub> emissions while conserving up to 170 million barrels of water per year.



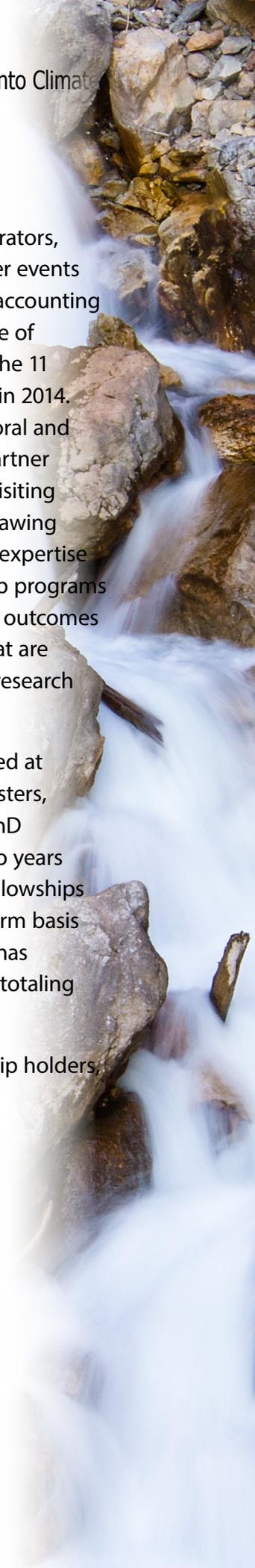
PICS Fellow Saad Dara, part of the CCEMC winning UBC team

## Fellowship Programs

Developing climate-friendly refrigerators, saving lives during extreme weather events and making carbon pollution cost accounting more accurate – these are just some of the projects being undertaken by the 11 new PICS graduate fellows funded in 2014. PICS fellowships support postdoctoral and graduate students from the four partner universities as well as established visiting scholars from around the world. Drawing on a continuous flow of talent and expertise from BC and beyond, our fellowship programs produce a diverse array of research outcomes related to climate change issues that are closely aligned with the Institute's research agenda.

In 2014, PICS fellowships were valued at \$12,000/year over two years for Masters, \$18,000/year over three years for PhD students and \$50,000/year over two years for postdoctoral fellows. Visiting fellowships are awarded on a periodic, short-term basis throughout the year. To date, PICS has awarded more than 90 fellowships totaling nearly \$3 million.

For a complete list of 2014 fellowship holders, see Appendix 2.



## Helping BC adapt to climate change – Dr. Ian Picketts

PICS is proud to see that the work of former PICS Fellow Ian Picketts is continuing to help British Columbia prepare for and mitigate climate change, through his ongoing post-doctoral research and his new teaching position at Quest University Canada, in Squamish.

Under his PICS fellowship, Ian studied community adaptation to climate change at the University of Northern British Columbia (UNBC). His research was interdisciplinary, action oriented, and focused on climate change adaptation in Prince George – the results of which directly contributed to the development of a climate change adaptation strategy for that city. In addition to completing a doctorate at UNBC in Natural Resource and Environmental Studies, Ian was awarded the Governor General’s Gold Medal as UNBC’s top graduate student.

Ian’s recent post-doctoral research looks at the interactions between climate impacts and the impacts of resource development in the Nechako watershed in northern BC. He also assisted in creating a plan for an integrated sea level rise management strategy for the BC lower mainland. PICS congratulates Dr. Picketts on his many successes in helping BC meet the climate challenge and prepare for a sustainable future.



UNBC’s top graduate student, PICS fellow Ian Picketts

## Internship Program

The highly successful internship program at PICS enables graduate and undergraduate students to conduct a variety of climate change research initiatives with a strong focus on solutions. Starting in 2010, PICS has now seen 69 internship students work in public sector and not-for-profit organizations

throughout British Columbia. This annual program supports the hiring of students from the PICS partner universities (UVIC, UBC, SFU and UNBC) on a four-month contract, with PICS providing baseline support of \$10,000 per intern and the employers providing top-ups.

From Prince George to Campbell River to Metro Vancouver, 2014 saw 12 students gain valuable hands-on learning while contributing to ongoing research around climate change solutions. Issues tackled in 2014 include developing regional flood management strategies for the Fraser Basin, adapting agriculture to climate change at a regional and farm level, the adoption of green building standards into the Building Code, and the role of urban forests in community resilience to climate change.

For a full list of students and projects supported in 2014 see Appendix 3.



PICS intern Russell Prentice harvesting eelgrass on the Comox estuary

## PICS Interns

Providing a community-based solution to climate change adaptation through improving shoreline resilience was the focus of work carried out by UBC Bachelor of Science student, **Russell Prentice** during his PICS internship with the Comox Valley Project Watershed Society.

The proposed restoration of intertidal and sub tidal eelgrass, complemented with shoreline salt marsh restoration, will contribute to estuarine carbon sinks as well as provide some protection from sea level rise due to climate change and storm surges. Russell's tasks included maintaining and operating a small boat, preparing eelgrass for planting and shuttling divers to planting sites. He has also assisted in a survey of inter-tidal sites that will later be restored using the GPS coordinates from the survey.

Recent extreme weather events provide insight to the impacts local governments can expect from climatic change, especially impacts on aging municipal infrastructure. This is an issue being grappled with at all levels of government but especially municipalities, which bear responsibility for most of the infrastructure at risk. Planning for such events

has become a core local government function.

Yet the economics of adaptation in Canada is at a nascent stage. SFU public policy masters student and PICS intern **Lisa Danielson** worked with the Adaptation to Climate Change (ACT) team to identify finance tools available in

Canada to either directly

finance infrastructure adaptation or catalyze adaptation measures. Collaborators include the City of Vancouver and the Cowichan Valley Regional District.



PICS intern Lisa Danielson



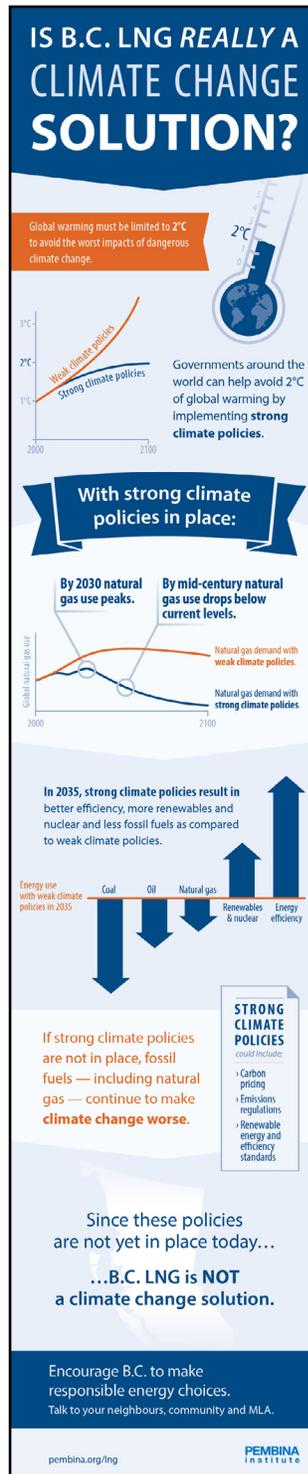
## Publications

PICS research generates a growing body of knowledge related to climate change mitigation and adaptation. All publications are solution-focused, and can be used to inform and guide policy-makers, educators, the research community, and the interested public.

## White Papers

The PICS white paper series consists of independent, peer-reviewed reports authored by leading researchers and policy experts commissioned by the Institute. White papers contain in-depth analysis and recommendations on a range of climate-related topics of key relevance to British Columbia. The following white papers were published in 2014:

- “LNG and Climate Change: The Global Context” by Matt Horne and Josha MacNab
- “The Effect of British Columbia’s Carbon Tax on Agricultural Trade” by Nicholas Rivers and Brandon Schaufele
- “Industrial and Market Development of Biochar in British Columbia” by Geoff



## BC's LNG not a climate solution

Research released in October by PICS and the Pembina Institute found that the BC government’s plan to increase the supply of liquefied natural gas (LNG) onto world markets won’t help solve climate change in the absence of strong climate policies, and could in fact, make it worse. The white paper “LNG and Climate Change: The Global Context” challenged the rhetoric that LNG would displace more GHG-intensive coal in the global energy mix. The research attracted extensive media coverage around the country, and sparked discussions via blogs, opinion articles and talk back radio. On CBC’s Early Edition BC Environment Minister Mary Polak agreed that LNG by itself was not a climate solution, but said it can be an important ‘bridge’ fuel to help nations transition from other fossil fuels. The Minister also praised the the white paper in the House, referring to the reversal of global climate change as “the challenge of our generation.” The Pembina researchers note that tying BC’s economic engine to a resource whose production will decline within 15 years if strong international climate policies do eventuate is a recipe for a boom and bust — something with which many BC communities are unfortunately all too familiar. Instead, government investment in renewable energy sources could promise a better future.

de Ruiter, Steve Helle and Michael Rutherford.

The white papers from 2014 have been downloaded 5200 times.

### Other PICS Publications

PICS research forms the basis of journal articles, book chapters, briefing notes, conference proceedings and theses produced by the Institute's fellowship holders, as well as special reports commissioned or supported by PICS. Below is a sample of the many reports published during 2014.

- British Columbians' opinions on climate change and clean energy: Results of a poll by PICS, Pembina Institute and Clean Energy Canada
- Incorporating climate change adaptation into local plans, by Ian Picketts, Stephan Dery, and John Curry (2014) *Journal of Environmental Planning and Management*.
- Achieving emissions reduction through oil sands cogeneration in Alberta's deregulated electricity market by Adrienne Ouellette, Andrew Rowe, Amy Sopinka, and Peter Wild, *Energy Policy*.
- Economic Analysis of Climate Change Adaption in B.C. Agriculture, by Kayleigh Donahue.
- Economic Trade-Offs between Carbon Offset and Timber Opportunities in British Columbia's Central

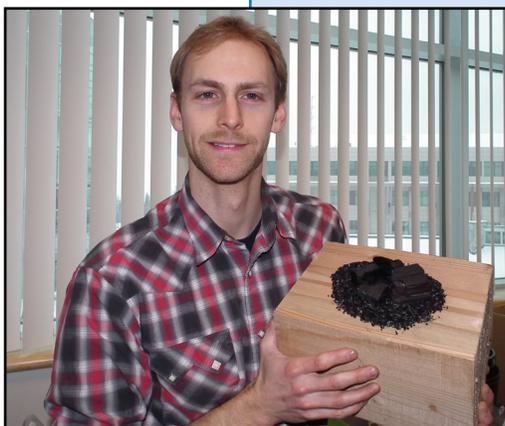
Coast: A Decision Analysis Approach, by Heather Munro.

- Transportation Futures for BC: Carbon Talks Dialogue Report
- The Columbia River Treaty: Fifty Years After the Handshake, by Amy Sopinka, and Lawrence Pitt, *The Electricity Journal*.

### Is biochar a climate solution?

UNBC PICS Fellow Geoff de Ruiter's 2014 white paper on the untapped potential of biochar as a potential climate change solution – as well as a profitable new industry – caught the attention of the BC Bioenergy Network, which is now considering a provincial strategy for the charcoal-like product that can directly substitute for coal. The paper, *Industrial and Market Development of Biochar in British Columbia*, reports that BC produces ten million tonnes of excess forestry or mill waste annually that, if made into biochar and used to substitute for fossil fuels, could cut provincial greenhouse gas (GHG) emissions by up to 22 per cent. That's two-thirds of BC's goal of 33 percent below 2007 levels by 2030. The government considers biochar to be a low carbon fuel because rather than introducing more carbon

to the atmosphere (as burning fossil fuels does), it releases carbon that would have biodegraded anyway. Biochar also offers potential for creating higher-return renewable products such as synthetic graphite.



It's not coal, it's biochar: Geoff de Ruiter, co-author of a PICS white paper that investigates the potential of this renewable fuel for BC.

## OUTREACH & EDUCATION

Raising public awareness and understanding of climate change is an essential foundation for effective action on global warming. PICS outreach efforts include hosting public events, briefings and expert lectures, and creating a range of free educational online products and publications.

PICS also regularly co-hosts free public events with its sister organization, the Pacific Climate Impacts Consortium (PCIC), resulting in a greater sharing of expertise across a wider range of disciplines. The vast majority of public lectures and panel events are live webcast and archived on the PICS website.

### Lectures & Seminars

#### PICS Public Lectures

Staff at the four PICS universities regularly host free public seminars featuring climate change experts across a broad spectrum of topics, ranging from adaptation and community health impacts, through to technology innovations for a carbon free future. Since September 2013, the Institute has also held lectures that showcase the results from PICS-funded projects and Fellows research. These presentations will be predominantly be held where the principal investigator is based – Vancouver, Victoria or Prince George. Full

details on the UBC-SFU-UNBC Public Lecture Series, and the UVic-hosted Pacific Climate Seminar Series are available in the Campus Updates section of this annual report.

#### Invited Speakers

In addition to its regular seminar and lecture series, PICS periodically hosts special public event with key climate change authorities from around the world. Invited speakers and topics during the past year have included:

- **George Marshall**, author and co-founder of the Climate Outreach Information Network (COIN), on why we are doing so little to address climate change despite the overwhelming scientific evidence. More than 300 people watched his lectures at UVic and UBC.
- The Cleantech Edge – a free public event on September 18 co-sponsored by PICS and the David Suzuki Foundation featured the following line-up of speakers sharing their insights into Canada’s fastest growing industry—cleantech: **Céline Bak**, president of Analytica Advisors; **Ross Beaty**, chairman of Pan American Silver Corp & Alterra Power Corp; **David Helliwell**, CEO of Pulse Energy; and **Jonathan Rhone**, CEO of Axine Water Technologies and head of the BC Cleantech CEO Alliance; **David Suzuki**



of the David Suzuki Foundation, and **Tom Pedersen**, executive director of PICS.

- **J.P. Jepp**, Shell Canada policy advisor and former Pembina Institute energy analyst, on Shell's global energy forecasts, and answering audience questions on climate responsibility and carbon pricing.

### Fellowship Symposium

The PICS annual fellowship symposium event gives our fellows the opportunity to present their current research as well as learn about the research undertaken by other graduate students working in the field of climate change solutions. This exchange of information always sparks lively discussion and fosters collaboration among the variety of research disciplines that PICS support through our fellowships program.

This year's event, held on April 29 in downtown Vancouver, also featured a panel discussion on "Communicating Climate Change Solutions" with guest speakers James Glave, Director, Communications, Clean Energy

Canada; Cara Pike, Director, The Social Capital Project; and Geoff Dembicki - Sustainability Reporter, The Tyee.

### Climate News Scan

2014 ushered in a new era in the production of the popular PICS Climate News Scan, with the hiring of an in-house Science Writer to produce most of the content, with article contributions from UBC's Sauder School of Business. The product has also been realigned with PICS new research direction, with its climate news and specific BC-analysis falling

under five themes: policy, energy, science, society and solutions.

The News Scan has enjoyed a steady growth in readership since its launch in 2009, with thousands of subscribers now signed up for this weekly summary of major climate change related

science, technology and policy advances from around the world. The close-working relationship between Sauder and PICS will ensure expertise continues to be shared, and the Climate News Scan, along with UBC's Clean Capital news product for the clean tech sector,



PICS Fellows at the symposium held in Vancouver, April 2014





continues to deliver critical information and analysis.

The PICS Newsletter continues to be produced as a quarterly and is widely distributed electronically and (as required) as hard copy. It contains details on the latest PICS research, announcements and events, past and upcoming.

## Climate Insights 101

Climate Insights 101 is a series of free, online animated interactive courses that provide an in-depth understanding of the science behind climate change and where the solutions lie in terms of mitigation and adaptation. 2014 saw the release of the third and final online course, BC Climate Impacts & Adaptation. Like its predecessor courses - Climate Science Basics and Mitigation Needs & Action - it contains test-your-knowledge sections and typically takes two hours to complete, although users can jump directly to individual topics within the lessons.

The new course has been of special interest to British Columbians, with data on how the province's climate has already warmed since 1900 and what changes lie ahead. BC is

projected to experience more warming than the global average in the coming decades with resulting impacts on water supplies, future crop viability and food security, extreme weather, distributions of pests, and urban and industrial planning.

Designed to bridge the gap between scientists and general society, Climate Insights 101 has online users in more than 170 countries. Its audience includes educators, policymakers, industry, NGOs, and members of the general public wanting to gain a comprehensive understanding of climate change. The courses



Climate Solutions from PICS' Climate Insights 101 course

combine animation, interactive quizzes, and interviews for a truly engaging experience.

The series has been developed and peer reviewed by leading climate scientists and experts from British Columbia. All products and teaching materials

are available on PICS' newly revamped education webpages.

## YouTube Videos

PICS has developed complementary products to the Climate Insights courses that make climate change education accessible via shorter animated videos, available on YouTube and the PICS website. The most recent releases

are two topical videos explaining “Carbon Tax and Trade” and “What You Can Do About Climate Change”. Also on offer:

• **Climate Insights: mini lessons**

These fun and engaging mini-lesson videos explain the basics of climate science and expose common climate myths. Most are under 10 minutes in duration.

• **Clear the Air**

These animated short videos refute common global-warming denier myths in under two minutes. Topics include: The Greenhouse Effect; The Sun’s influence; Mother Nature; Human Influence; Climate Change Consensus, and The Earth is Cooling?

Over the past year PICS has showcased the suite of Climate Insights 101 products in BC schools, public libraries, and university education expos, as well as to community groups and NGOs. The series’ global audience continues to grow, with the 10 YouTube videos now being translated into Finnish by the Finnish Meteorological Institute.

## Media Coverage

2014 has proven another busy year for PICS in the mainstream media, with solid coverage of its research within Canada, and regular requests for PICS expert commentary on climate issues. Announcements by the Institute that attracted the most widespread interest and discussion within media, government and industry circles include the white papers LNG and Climate Change:



PICS’ program co-ordinator Kyle Aben discusses PICS’ carbon forestry project with CKPG NEWS

The Global Context, and The Effect of British Columbia’s Carbon Tax on Agricultural Trade.

In 2014, PICS featured in the following print, online and broadcast media:

- **Print & Agency:** Globe and Mail, Vancouver Sun, The Seattle Times, Reuters, Calgary Herald, Bloomberg BNA, Times Colonist, The Tyee, The Hill, The Canadian Press, The Economist, Bloomberg News, Kamloops Daily News, Edmonton Journal, Huffington Post, Business in Vancouver, 24 Hours Vancouver, Sun News, Yahoo News Canada, Metro News, Pique Newsmagazine, Globe-Net, The Province, Winnipeg Free Press, Metro News, Teru Talk, Victoria News, The Prince George Citizen, Surrey Leader, Clean Tech Canada, The Star, Blackburn News, Focus Magazine, Comox Valley Record, Pulse Energy, The StarPhoenix, Tax News, Vancouver Observer, Better Farming, BC Forest Professional, Canadian Business, Chilliwack Progress,



Environmental Expert, The Ring, Georgia Strait, Metro News, HQ Cowichan Valley, The Delta Optimist, Nanaimo Bulletin, Biomass Magazine, Windsor Star, and 250 News

- **Radio:** CBC Radio News, CBC Daybreak South, CKNW Bill Good Show, Radio NL Kamloops, Radio New Zealand, 570News, CBC On the Island, CBC Kelowna, CFAX Radio 1070, BC Almanac
- **Television:** Global News BC, UBrain TV in Brussels, CTV News, Aljazeera America, Global News Top Story, CKPG TV, Shaw TV
- **Blogs:** DeSmog Canada, EcoLog, Phys.org

## Website & Social Media

The PICS website houses information on the Institute's research activities and outcomes, news, events, publications, free education tools, funding programs, and other climate related resources. PICS social media communication has continued to grow over the past year via its Facebook and Twitter channels and through its Climate Insights 101 online products.



## Kayleigh Donahue

Unraveling the implications of climate change for BC agriculture was the goal of PICS intern and UVic economics masters student Kayleigh Donahue, who worked as a Climate Change Analyst

for the BC Ministry of Agriculture during summer 2014. Her duties included research and reporting on methods of assessing and presenting impacts such as crop losses and insurance; analyzing ministry crop insurance and AgriStability records from the last 20 years; developing "planning scenarios" for BC agriculture that incorporate key climate stressors (droughts, floods, extreme weather, sea level rise, and pest outbreaks), and then estimating their economic implications; and assessing the economic benefits of adaptation such as reducing risk and vulnerability.

This work built on regional climate projections in the Risk and Opportunity Assessments commissioned by the BC Agriculture Council (and supported by PICS and the Pacific Climate Impacts Consortium).



## CAMPUS UPDATES

### University of Victoria

As the host institution, UVic houses the central PICS office, comprising the executive and associate directors, four full-time and two part-time staff. PICS at UVic is responsible for directing the Institute's overall programming and outreach activities. This includes administering the PICS research, fellowship and internship programs; producing the weekly News Scan and white paper series; organizing PICS annual forums, lectures and other events; creating the Climate Insights 101 short courses; and managing the Institute's promotional activities and media relations, as detailed earlier in this report.

#### Pacific Climate Seminar Series

The Pacific Climate Seminar Series is a joint PICS-PCIC initiative of UVic-based public talks by local and visiting lead researchers. The series runs from September to April, with a talk typically held on the third Wednesday of each month from 3:30pm- 4:30pm.

With a focus on climate science, regional impacts and potential solutions, seminar topics over the past year include: what regional and global climate models are projecting for future temperature and precipitation over South Asia, in particular during monsoons under a changing climate; how rising demand for water in Canada coupled with climate change is impacting streamflow and aquatic eco-systems, and how increasingly sophisticated assessment tools are being developed to better predict

and manage future hydrology supplies; and a report from PICS-backed research on how eelgrass meadows and salt marshes can contribute to the uptake and storage of carbon from the atmosphere, called Blue Carbon.

#### Outreach

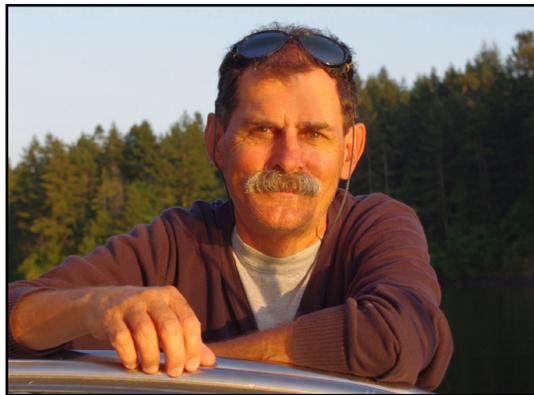
PICS staff members at UVic have given presentations to a wide variety of audiences over the past year. PICS Executive Director Tom Pedersen has lectured frequently on climate-change issues and solutions to universities, community groups, NGOs, government sectors, and professional and business organizations, among others. Audiences in 2014 included the BC Nature Society (Victoria), the Cowichan Estuary Restoration and Conservation Association (Duncan), the UN-sponsored Latin American Carbon Forum (Bogota, Colombia), the Cleantech Edge Forum (Vancouver), BC Ministry of Agriculture (Victoria), Yukon Climate Change Adaptation Speaker Series (Whitehorse, Yukon), French-American-Canadian Talks Series (Vancouver), James Bay Community Centre (Victoria), the Air and Waste Management Association of British Columbia (Victoria), BC Ministry of the Environment (Victoria), Association of Professional Engineers and Geoscientists of BC (Victoria), BC NDP Environment and Economy Caucus (BC Legislature), the 15th International Conference on Environmental Taxation (Copenhagen, Denmark), North Saanich Municipal Council, and the American Geophysical Union (San Francisco). Multiple media interviews have also been given by the Executive Director. Dr. Pedersen also helped advise Metro Vancouver on establishing a

new, large-scale waste-to-energy facility in the region.

### PICS UVic personnel changes

In December 2014 PICS bid farewell to its Associate Director, Dr. Lawrence Pitt, who has returned to his engineering roots at the Institute for Integrated Energy Systems at the University of Victoria. Lawrence has been with PICS since its inception, initially as UVic's campus coordinator and then as Associate Director. Lawrence will continue to share his expertise with PICS as a key member of the 2060 Project on electrical grid integration.

December also saw the departure of Science Writer Ami Kingdon, who has taken up an Associate Editor position with Hakai Magazine but still provides valuable contributions to the PICS Climate News Scan. A new Science Writer, Leigh Phillips, will join PICS in March 2015, bringing his in-depth experience as a European affairs and science journalist to PICS outreach efforts and publications.



Dr. Lawrence Pitt bids farewell to PICS

outreach program and participating in special events to encourage community action on the climate change challenge. The university achieved Sustainability, Tracking, Assessment & Rating System (STARS) Gold in sustainability in 2014 - PICS SFU Program Coordinator Nastenka Calle, as a member of the VP Research Senior Sustainability Council working group, was involved in that process.

### PICS collaborations at SFU

PICS SFU has been collaborating with SFU Carbon Talks since September 2011 co-sponsoring the Public Carbon Talks

Dialogues. The goal of these public dialogues is to raise awareness of innovations and innovators in the low-carbon economy and to profile key emerging issues related to climate change mitigation and adaptation. This year's talks highlighted some of the efforts of BC organizations to reach

a carbon pollution-free future. Some of the public discussions are summarized below:

- Small Steps in Ecological Footprinting, with former PICS Fellow **Jennie Moore**, BCIT
- Beyond the Politics: The Benefits of Moving in a Livable Region, Vancouver, with **Nancy Olewiler**, SFU, **Shauna Sylvester**, SFU – CarbonTalks, **Ken Peacock**, Business Council of British Columbia

### Simon Fraser University

Raising awareness on climate action, promoting energy conservation and strengthening long-term partnerships were a central priority for PICS SFU in 2014. Highlights include hosting public dialogues, lectures and forums on climate change solutions both on-and-off campus, an active educational

- Waste to Energy, Low-carbon Future? With **Dr. Paul Richard**, Kwantlen Polytechnic University and **Dr. Douw Steyn**, UBC
- Divest: Smart Strategy or Selling Out? With **Andrea Reimer**, City of Vancouver, **Marc Lee**, CCPA and **Jamie Bonham**, NEI Investments



University Highland elementary school students learn about the GHGs, their sources and how they are affecting the climate.

conservation game that uses graphics to teach about power consumption choices. During the

study, participants made decisions over everyday home activities, such as using cold or hot water in the laundry, turning lights on or off, unplugging electronic devices when not being used, and using the fan instead of the air-conditioner to cool the house. The outcomes of those energy-related decisions then impact subsequent graphics. The

feedback given was used to fine-tune the game and its possible applications.

### Energy Conservation – Educational workshops

PICS SFU, in collaboration with SFU Science in Action, continued in 2014 with its successful energy conservation program aimed at younger members of the community.

Children from grades 4 to 8 gain a hands-on opportunity to explore different ways to generate “green” energy using wind, sun and water as a power source, and to understand the concept of the greenhouse effect and its impacts using the Climate Insight 101 Bite

Size video series as a teaching and learning tool. This program was launched on June 2011, and this past year PICS SFU reached 27,752 people at family science workshops and special presentations.

In 2014 the workshops also provided a means for researchers to test out a new energy

### Cutting transport emissions at SFU

Transportation accounts for the largest share of the provincial GHG emissions – close to 40% of the total in 2011. As part of efforts to reduce its carbon footprint, SFU in partnership with PICS-SFU sponsored a “GHG Transportation Project” focusing initially on commuter travel.

A survey to map the behaviors on commuting travel took place in April 2014, with nearly 8,000 people participating. The feedback from the survey will help plan for future policy

and actions related to ridesharing, parking, bike storage, and other transit and mobility initiatives.



### Green Tech Exchange Forums

The partnership between Green Tech Exchange (GTex) and PICS SFU continued this past year supporting public forums and networking events that advanced innovation and expertise in the green economy. Those forums took place in the Lower Mainland and on Vancouver Island and aimed to engage entrepreneurs, professionals, industry members, students and the general public. GTex forum highlights in 2014 include: Pathways to Green Transportation: Highlights of BC Development; Thinking Outside the Box: Energy Efficiency and Green Buildings; Understanding Energy Options: LNG?; and Novel Water Treatment Technology.

### Outreach

PICS SFU Program Coordinator Nastenka Calle accepted invitations to participate in community events around the Lower Mainland in 2014, among them, the 23rd Fingerling Festival hosted by the Port Moody Ecological Society, the Community Science Celebration at Science World, Science Rendezvous, the Science Bash at the Richmond public library. These events provided an opportunity to raise awareness on the impacts of climate change and engage the audience in taking climate action.



Dr. Kate White, UBC and Dr. Stephanie Bertels, SFU, on Changing Behaviours for a More Sustainable Future (October, 2014)

### University of British Columbia

Community energy planning, sustainability, and climate change communications were key themes of PICS UBC's activities over the past year, with a wide range of events being supported and co-hosted with other climate-change specialists and groups both on and off campus. PICS UBC Program Manager Sara Muir-Owen organised PICS climate change research lectures, attended a number of regional conferences, gave presentations, and partnered on many initiatives, including the

Community Energy Systems Symposium with Metro Vancouver, QUEST and the Collaborative for Advanced Landscape Planning at UBC.

### UBC-SFU Public Lecture Series

Since 2010, PICS UBC and SFU have jointly hosted a free public lecture series

where professors from both universities engaged with the public on diverse climate change topics with the objective to inform and motivate the public to take climate action. Since its launch, the series has brought more than 35 UBC and SFU faculty members together and has reached more than 3000 people attending either in person or watching live via webcast. This year the series also highlighted the results of some of the PICS funded projects where SFU and

UBC researchers were involved and worked in collaboration with other organizations. Speakers during 2014 include:

- **Professors Ronald Kellett and Cynthia Girling**, UBC, **Michael Wollinetz** from Navius Research, and **Jeremy Moorhouse**, SFU, on “Planning Cities for Climate Change: Lessons Learned through Energy Modeling and Community Engagement”
- **Dr. Shannon Daub**, Canadian Centre for Policy Alternatives (CCPA) and **Shane Gunster**, SFU, on “The Good Life, The Green Life”, a documentary film that aims to motivate concerned citizens to take action on the climate change challenge
- **Dr. Stewart Cohen**, Environment Canada, **Dr. Lori Daniels**, UBC and **Dr. Jonathan O’Riordan**, SFU – ACT, on “Adapting to Climate Change: Global Knowledge, Local Action”
- **Dr. Kate White**, UBC and **Dr. Stephanie Bertels**, SFU, on “Changing Behaviours for a More Sustainable Future”
- **Dr. Maged Senbel**, UBC and researchers **Erik Blair** and **Victor Ngo**, UBC, on “Using Digital and Social Media to Mobilize Climate Action: From Communities of Interest to Communities of Practice”

Recordings of PICS-sponsored talks through 2014 can be viewed at <http://pics.uvic.ca/events/archive/webcast>.

## PICS UBC Outreach

### Climate Change Symposium –

**Nanaimo:** On October 18, Sara Muir Owen, PICS-UBC was a speaker and panelist at a climate change symposium, titled “The Science of Climate: The Opportunities for Change” hosted by the Regional District of Nanaimo (RDN) in partnership with the City of Nanaimo. Fellow speaker, Professor Jeff Lewis, from Vancouver Island University (VUI), provided an overview on the science of climate change, and a summary of the Intergovernmental Panel on Climate Change (IPCC) Fifth Assessment Report. Sara presented some of BC’s current policies to address climate change including the carbon tax, and highlighted the need for integrated environmental, social and economic solutions to address climate change. A panel session followed, featuring Deanna Fourt from the Vancouver Island Health Authority; Daryl Amos from VUI; and Chris Midgley, Manager of Energy and Sustainability, RDN. The audience gained insights into the challenge and opportunities arising from climate action at a local level.

## University of Northern British Columbia

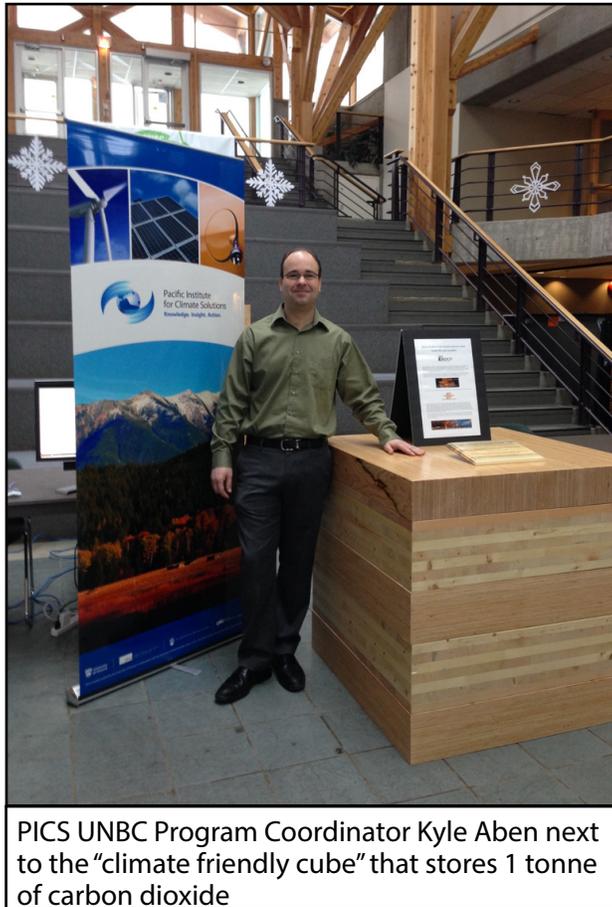
On-campus clean energy solutions and adaptation initiatives underpinned by research were key features of PICS UNBC activities for 2014 at Canada’s “Green University”. PICS UNBC Program



Co-coordinator Kyle Aben also extended carbon accounting education beyond the university campus, with outreach efforts into the community and wider British Columbia.

### Solar Energy Research

PICS is contributing to a project to support educational activities around solar energy at UNBC and in Prince George. The project involves purchasing a professional grade pyranometer (to measure diffuse and direct solar energy) as well as supplies to build extra pyranometers. Internship students assembled the do-it-yourself kits, using the professional grade instrument used for calibration. The pyranometers are part of the UNBC weather station, and the data collected will be used by students to study solar photovoltaic (PV) energy in the northern community and at UNBC. Interestingly, the efficiency of solar PV increases in colder temperature and is particularly well-suited for Canada's climate. PICS is a proud supporter of this \$8000 project, alongside the major funder, the UNBC Green Fund.



PICS UNBC Program Coordinator Kyle Aben next to the "climate friendly cube" that stores 1 tonne of carbon dioxide

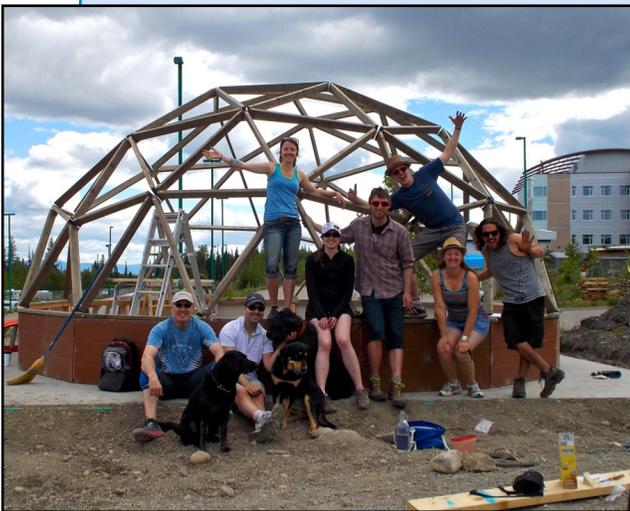
### Climate Friendly Cube

Ever wondered what a tonne of carbon dioxide looks like stored in wood? The suggestion for creating the impressively large "climate friendly cube", a 1m by 1m by 1m block of British Columbian wood, came from PICS UNBC forestry carbon researchers Wyatt Klopp and Art Fredeen, as a way to visually communicate the importance of forests and timber

for carbon capture and storage. Trees convert carbon dioxide ( $\text{CO}_2$ ) to long-lived cellulose-carbon through photosynthesis. This sequestration of  $\text{CO}_2$  is what sets wood apart as a climate friendly building material from others such as steel and concrete that emit carbon during production. If the same weight of concrete and steel was used to produce a similar cube it would be half the size and would release two tonnes of  $\text{CO}_2$  into the atmosphere instead of sequestering it as wood does. The 'carbon dioxide tonne' debuted during the campus' 2014 Green Day held January 28th.

## Dome greenhouse at UNBC

The UNBC student club, Students for a Green University (SGU) and the Northern Undergraduate Student Society (NUGSS), built a geodesic dome greenhouse on campus in 2014, with help from PICS. The greenhouse will enable students to grow food locally for an extended period of time throughout the year. By doing so, UNBC students will be helping to close the loop on organic waste production by using the dome's compost to grow produce for the university's student run pub. PICS sponsored this project to help students seek solutions to the food challenges of a colder northern climate, and to get an eye into the future growing conditions in Prince George, due to climate change.



Pictured (from left to right) are Art Fredeen, Kyle Aben, Deanna Rach, Amanda Drew, Manager Kyrke Gaudreau, Mike Watson, Minetta Norrie, and Dave Pow

## PICS UNBC Outreach

Want to learn how GHG emissions are calculated and converted to a carbon dioxide equivalent (CO<sub>2</sub>e)? Students at Quest University in Squamish BC were able to do just that when PICS UNBC Program Coordinator Kyle Aben was invited to teach as a Visiting Tutor during the Fall 2014 term. The course, Carbon Accounting 3504, gave students high level knowledge about the following: calculating personal and corporate carbon footprints including the lifecycle assessment of emissions; the GHG warming potential of different gases; the process of carbon neutrality and how carbon projects are created in order to distinguish a quality from a poor offset; and how to measure the emissions of different energy uses and travel demands, using internationally recognized protocols and tools. The emissions sequestered by forests and stored in wood products were also discussed, as were GHG free technologies and the clean technology sector.

The students successfully completed a very ambitious class project to measure and complete Quest's first ever carbon footprint assessment in just eighteen days. With a geothermal system and the vast majority of students living on campus, removing the need to commute to school, the small university is quite climate friendly. Kyle Aben is a certified greenhouse gas inventory quantifier (GHG-IQ) through the Canadian Standards Association.

## Sponsored Initiatives

Special initiatives supported by PICS in 2014 include:

- **FACTS “Climate Change and Solutions from Innovation”** free public conference in Vancouver, November 12, 2014. Organised by French embassies in Canada and the US.
- **Quality Urban Energy Systems of Tomorrow (QUEST) 2014**, in Vancouver, 1-3 December 2014. This event focused on improving energy efficiency, cutting costs, enhancing reliability and reducing greenhouse gas emissions.
- **Community Energy Symposium** 2014, in New Westminster, September 11, 2014. PICS UBC worked with the Collaborative for Advanced Landscape Planning (CALP), QUEST and Metro Vancouver to host this event. PICS UBC continues to work with CALP to advise on the District of West Vancouver Community Energy Emissions Plan.

a timely manner. CAS and other government representatives frequently attend PICS lectures and meet with invited speakers to discuss a wide range of relevant topics.

## Working with the BC Government

PICS continues to build and maintain strong relationships with the BC government, primarily through the Climate Action Secretariat (CAS). The PICS Executive committee includes a representative from CAS, and the PICS Executive Director communicates regularly with the Head of CAS to keep the province up to date regarding ongoing PICS activities, as well as to ensure that PICS-supported research is addressing provincial government information needs in

## FINANCIAL REPORT

PICS is funded through an original \$90 million endowment given in 2008 from the Province of British Columbia and held by the University of Victoria Foundation. The 2013/14 budget to support PICS operations was \$3.5 million.

Budget expenditures are summarized as follows:

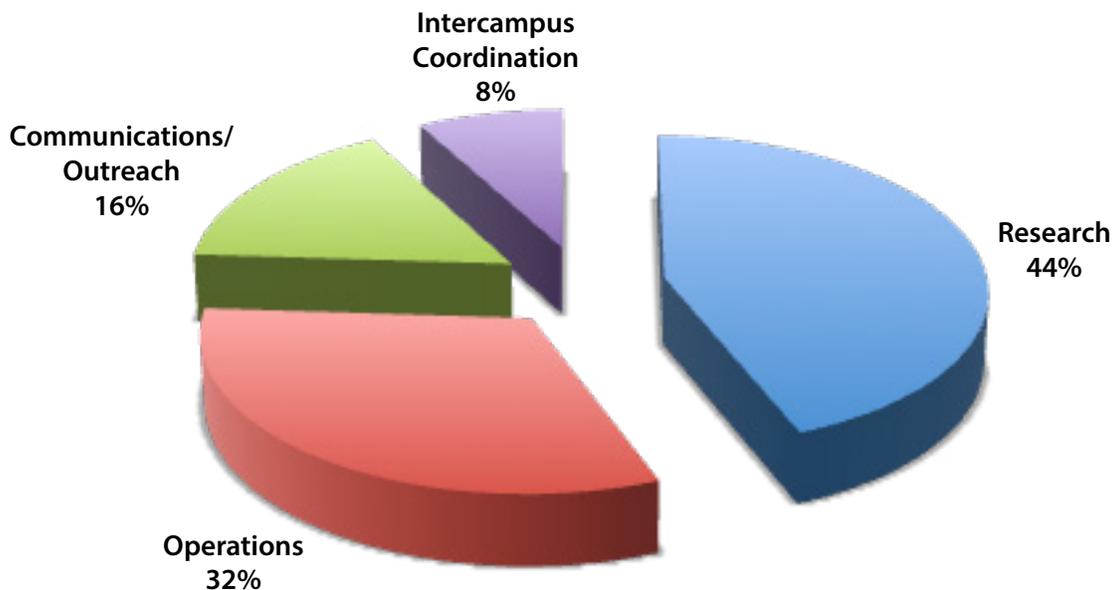
Funded Research includes: research theme projects, fellowships, unsolicited proposals, internships and white papers.

Operations include: UVic overhead, salaries and administrative costs.

Outreach and Communications include: PICS seminars and events, briefing note and news scan program, short courses, sponsorships and the annual forum.

Intercampus Coordination includes: funding for the PICS Campus coordinators at the University of British Columbia, Simon Fraser University and the University of Northern British Columbia.

**PICS Budget Expenditures 2013-2014 \$3.5 million**



## APPENDIX 1: GOVERNANCE

### Board and Committee Membership: January 1, 2014 to December 31, 2014

#### Advisory Board

**Michael Miller**, Associate Vice-President Research, UVic(Chair)

**Lori Ackerman** Mayor, Fort St. John

**Karen Dodds**, Assistant Deputy Minister, Environment Canada

**Mark Edwards**, Director, Environment, Teck Cominco Ltd.

**Richard Flury**, former Chief Executive, Oil, Gas and Renewables, BP plc (retired)

**Graham Kissack**, External Consultant, Sustainability, Catalyst Paper Corporation

**Gordon Lambert**, Vice-President, Sustainable Development, Suncor Energy

**Doug Little**, Vice President, Powerex

**Jonathan Rhone**, President and Chief Executive Officer, Axine Water Technologies

**Peter Robinson**, Chief Executive Officer, The David Suzuki Foundation

**Mossadiq Umedaly**, Cleantech Entrepreneur and Business Executive

#### Executive Committee

**David Castle**, Vice-President Research, UVic (Chair) from July 2014

**Howard Brunt**, Vice-President Research, UVic (Chair) to June 2014

**Ranjana Bird**, Vice-President Research, UNBC

**Ken Denman**, Chief Scientist, Victoria Experimental Network Under the Sea (VENUS), UVic

**Joy Johnson**, Vice President Research SFU from September 2014

**Peter Keller**, Dean of Social Sciences, UVic to August 2014

**Catherine Krull**, Dean of Social Sciences, UVic from from September 2014

**Susanna Laaksonen-Craig**, Head, Climate Action Secretariat, BC Ministry of Environment, from September 2014

**James Mack**, Head, Climate Action Secretariat, BC Ministry of Environment to August 2014

**Michael Miller**, Associate Vice-President Research, UVic

**Tom Pedersen**, Executive Director, PICS

**Mario Pinto**, Vice-President Research, SFU to August 2014

**Brent Sauder**, Director, Strategic Initiatives, Office of the Vice President Research and International, UBC

## Program Committee

**Tom Pedersen**, Executive Director, PICS (Chair)

**Stephanie Bertels**, Assistant Professor, Technology, Operations Management / Innovation & Entrepreneurship, SFU

**Art Fredeen**, Professor, Ecosystem Science and Management, UNBC

**John Fyfe**, Research Scientist, Canadian Centre for Climate Modelling and Analysis, Environment Canada

**Robert Gifford**, Professor, Department of Psychology, UVic

**Zoe Meletis**, Assistant Professor, Geography, UNBC

**Walter Merida**, Associate Professor, Department of Mechanical Engineering, UBC

**Lawrence Pitt**, Associate Director, PICS

**Stephen Sheppard**, Professor, Faculty of Applied Sciences, School of Architecture & Landscape Architecture; Forest Resources Management, Faculty of Forestry Director, UBC

**Curran Crawford**, Professor, Department of Mechanical Engineering, UVic

**Tim Takaro**, Associate Professor, Faculty of Health Sciences, SFU

**Thomas White**, Manager, Science and Adaptation, CAS, BC Ministry of Environment

## APPENDIX 2: PICS FELLOWSHIP HOLDERS

### Graduate Fellowships 2014

#### Simon Fraser University

**Kaitlin Boyd**, Master's Candidate, Resource & Environmental Management: *The social cost of carbon and Canadian climate policy*

**Jordan Burbacher**, Master's Candidate, Faculty of Health Sciences: *Can boil water advisories in BC be linked to extreme weather events that may increase with climate change?*

**Khorshid Fayazmanesh**, PhD Candidate, Mechatronic Systems: *Development of advanced composite materials for adsorption cooling systems*

**Derrick Ho**, PhD Candidate, Geography: *Mapping and managing heat-related vulnerability and mortality in British Columbia: A case study in the GVRD.*

**Sabine Jessen**, PhD Candidate, Geography/ Resource & Environmental Management: *Planning for marine ecosystem resilience under climate change in British Columbia.*

**Melissa Kruger**, Master's Candidate, School of Public Policy: *Climate Change and the Energy-Water Nexus: Implications and Obligations for the Columbia River Treaty.*

**Isabelle Larocque**, Master's Candidate, Earth Sciences: *A framework for identifying climate change impacts and management strategies related to groundwater resources in mountain communities.*

**Mary Ann Middleton**, PhD Candidate, Earth Sciences: *Evaluating the impacts of climate change and water use on groundwater sensitive streams.*

**Heather Munro**, Master's Candidate, Resource and Environmental Management: *Trade-offs between carbon offsets and timber harvest revenue opportunities in the central coast of BC: A decision analysis approach.*

**Sukhraj Sahota**, Master's Candidate, School of Public Policy: *Climate Change and the Energy-Water Nexus: Implications and Obligations for the Columbia River Treaty.*

**Michael Ton**, Master's Candidate, Geography: *Ecological resilience to disturbance interactions in pine forests of central interior British Columbia.*

**Barbara Wilson**, Master's Candidate, Education: *Education/Mobilizing communities for Action in a World of Changing Climate: Initiating action on Haida Gwaii.*

## University of British Columbia

**Saad Dara**, PhD Candidate, Chemical and Biological engineering: *Coupled removal of carbon dioxide and water treatment for BC relevant industries.*

**Syed Raza Jaffery**, Master's Candidate, Civil Engineering: *Utilizing Building Information Models (BIM) to Monitor Building Performance.*

**Thor Jensen**, PhD Candidate Institute for Resources, Environment and Sustainability: *Development models for community scale heating utilities.*

**Stephen Mak**, Master's Candidate, Earth and Ocean Science and Mining engineering: *Assessment and mitigation of geo-risk associated with the development of enhanced geothermal systems.*

**Georgia Piggot**, PhD Candidate, Sociology: *Collaborative networks and climate change action: A British Columbia case study.*

**Paul Teehan**, PhD Candidate, Resource Management & Environmental Studies: *GHG implications of cloud computing: Analyzing large data centre construction in the Columbia Basin.*

**Robert Tsin**, Master's Candidate, Population and Public Health: *Surface Temperature Heat Mapping in the Lower Mainland.*

**Lisa Westerhoff**, PhD Candidate, Resource Management & Environmental Studies: *Governance for climate change: Local decision-making for low-carbon, resilient communities.*

**Lilia Yumagulova**, PhD Candidate, Resource Management & Environmental Studies: *Resilient by design: The role of institutional adaptation to environmental risk in cities.*

## University of Northern British Columbia

**Alana Clason**, PhD Candidate, Natural Resources & Environmental Studies: *The resilience of high-elevation ecosystems to cumulative disturbances across a climatic gradient.*

**Geoff de Ruiter**, PhD Candidate, Environmental science/engineering: *Comparing industrial biochar applications: Optimizing revenue versus CO<sub>2</sub>-equivalent emissions reductions or carbon sequestration.*

**Ben Pelto**, PhD Candidate, Geography: *Planning for climate-induced changes to the Columbia Basin's Freshwater Resources.*

**M. Alexander Schare**, PhD Candidate, International Studies: *A Comparative Study of the Carbon Footprint of Interurban Passenger Transportation in British Columbia, and Measures to Mitigate It.*

## University of Victoria

**Jeffrey Daines**, Master's Candidate, Earth and Ocean Science: *Assessing the Present and Future Wind Energy Resource in Western Canada.*

**Jeff English**, PhD Candidate, Mechanical Engineering: *GHG mitigation through coordinated management of large hydro reservoirs in adjacent jurisdictions.*

**Italo Franchini**, Master's Candidate, Mechanical Engineering: *Prospects for optimal tidal energy integration in British Columbia.*

**Karine Lacroix**, Master's Candidate, Psychology: *Choices and climate change: The differential importance of social and psychological barriers for climate-positive behaviours across seven segments of the British Columbia population.*

**Heike Lettari**, Master's Candidate Environmental Studies: *Social adaptation to rapidly changing ecosystems.*

**Benjamin Lyseng**, PhD Candidate, Mechanical Engineering: *Methane at the gate: the role of natural gas in future energy systems.*

**Erik Schindler**, PhD Candidate, Business, *Securing energy and water sustainably: Managing critical inputs for an expanding mining industry in BC.*

**Lajevardi Seyedmotjaba**, PhD Candidate, Mechanical Engineering : *BC LNG Policy: A net CO benefit?*

**Nancy Shackelford**, PhD Candidate, Environmental Studies: *Ecosystem resilience and changing climate: detecting catastrophic change before it happens.*

**Cedar Welsh**, PhD Candidate, Geography: *Past trends and future change in the hydrologic regime of the upper Stikine River basin in northern British Columbia, Canada.*

## Postdoctoral Fellowships

**Dr. Pouria Ahmadi**, Mechanical Engineering, SFU, *Lifecycle Assessment of Emerging Vehicle Technologies.*

**Dr. Amy Sopinka**, Economics, UVic: *Understanding western electricity markets with a view to pricing carbon.*

## APPENDIX 3: STUDENT INTERNSHIPS 2014

### Adaptation to Climate Change Team - SFU

**Lise Danielson**, SFU Master's of Public policy, Graduate Researcher

### City of Campbell River

**Clair Cameron**, UBC Environmental Science, Living Carbon Project

### City of Surrey

**Rebecca Chaster**, UBC SCARP, Sustainability office Project Management Assistant

### Clean Energy Canada

**Carson Pfahl**, UBC Political Science, Communicating Clean Energy Economy

### Climate Smart

**Elissa Liu**, UBC, Environmental Science, Data Analysis and Client Support Intern

### Comox Valley Watershed Society

**Russell Prentice**, UBC, Geographical Biogeosciences, Blue Carbon Intern

### Fraser Basin Council

**Caroline Ransay**, SFU, Master's of Public policy, Project Coordinator Regional Flood Management Strategy

### Metro Vancouver

**Jeff Gaisano**, UBC, Master's of Business Administration, Quantifying the Environmental and Economic Costs of Food Waste

### Ministry of Forests, Lands and Natural Resources

**Hudson Stoffels**, UBC Integrated Engineering, Climate Change and Natural Disturbances in Northern BC

### Ministry of Forests, Lands and Natural Resources

**Derrick van Tol**, UNBC Wildlife and Fisheries, Quantifying the water budget for Coles Lake Northeastern BC

### Ministry of Agriculture

**Kayleigh Donahue**, UVic Master's of Economics, Agricultural Climate change Adaptation analyst

### The Pembina Institute

**Maximillian Kniewasser**, SFU Master's REM, Energy Efficient Buildings Project Intern

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