



Pacific Institute
for Climate Solutions
Knowledge. Insight. Action.

ANNUAL REPORT 2016



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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2016 IN REVIEW: Dr. Sybil Seitzinger PICS executive director



As 2016 burnt through the records to become the hottest year since modern temperature recordkeeping began in 1880, we are reminded of the importance of the work carried out by the Pacific Institute for Climate Solutions (PICS) and other organizations

tackling the challenge of anthropogenic climate change.

Action at all levels of society will collectively define our future global climate, and it is encouraging to see the great strides made in Canada during 2016. We also need to recognise where more work is needed.

In particular, the signing of the first Pan-Canadian Framework on Clean Growth and Climate Change by all territories and provinces (except Saskatchewan) is a major achievement. New federal deals during 2016 to phase out coal-fired electricity, a new low-carbon fuel standard and a national climate carbon price are also noteworthy.

However these gains for carbon mitigation gains must be weighed against other federal decisions that support expansion of the fossil fuel sector, including the approval of new oil pipelines, and liquefied natural gas facilities in BC. Also, we must not forget the crucial importance of developing effective and sustainable climate change adaptation plans.

A PICS-commissioned analysis of British Columbia's climate policies has revealed a similar mixed picture. In December, together with the Pembina Institute and Clean Energy Canada, PICS released an independent assessment of BC's Climate Leadership Plan (CLP) and Federal Carbon Price on BC's greenhouse gas emissions,

which puts some useful numbers on the challenge before us.

While the CLP does target all the major sources of emissions in this province, this plan will take BC only about one third of the way towards meeting its 2050 emissions reduction target. In other words, our analysis shows that the policies in the CLP will cut forecast annual emissions down from 76Mt to 54 Mt by 2050, but this is still well short of the legislated target, which is 12.6 Mt.

Stronger policies to decarbonize industry, transport and the built environment, and to reduce emissions from natural gas are needed to bridge that gap. The BC government has said that the CLP is the first step towards the 2050 goal, and PICS and its partners are committed to supporting the development and implementation of those next steps.

In that same spirit of ongoing improvements, this year within our own organisation I commissioned an independent organizational review of PICS. After seven years in operation, such a review of our products, structure and activities is timely to ensure we are being as effective as possible in developing mitigation and adaptation solution options to climate change that are impactful in driving positive change. Also, we want to ensure that creativity and innovation are key drivers behind identifying those solutions, and in communicating the results.

To date more than 90 people both within and outside the PICS community have been consulted, and I look forward to the development and launch of a strategic plan for PICS by mid 2017.

In the meantime, our established research programmes have continued to achieve outstanding results. Highlights of 2016 include a suite of research results from our

“Big 5” projects, which directly target the biggest sources of greenhouse gas emissions in BC – transportation, buildings, natural gas development, and energy – as well our project on maximising forestry’s potential for sequestering carbon.

Research results that grabbed media headlines include the finding that trees are now growing faster in parts of BC due to climate warming, which is helping forests recover from the recent mountain pine beetle devastation quicker than expected— although other climate change impacts can

cause harm. Likewise, a reality check on the common assumption that BC hydropower can substitute for Alberta’s coal energy has been provided by PICS’ 2060 project, in its modeling scenarios for decarbonizing Canada’s electricity grids. Solutions can be offered instead through expanding transmission lines to support renewables in Alberta.

I am pleased to say that both the 2060 Project and the Forest Carbon Management Project received approval for ongoing funding based on their 2-year external review, with other “Big 5” up for review in 2017.

Leading research is also being conducted by our PICS Fellows who are working across an array of disciplines that range in focus from renewable energy technologies and protecting vulnerable species, through to city adaptation planning, and inspiring climate action. Our internship programme continues to support climate

research within the public sector and non-profits, with this year’s students working in the forestry, agriculture and clean transport sectors.

Our commitment to enhancing the public dialogue around climate change issues has continued, through the hosting of talks,

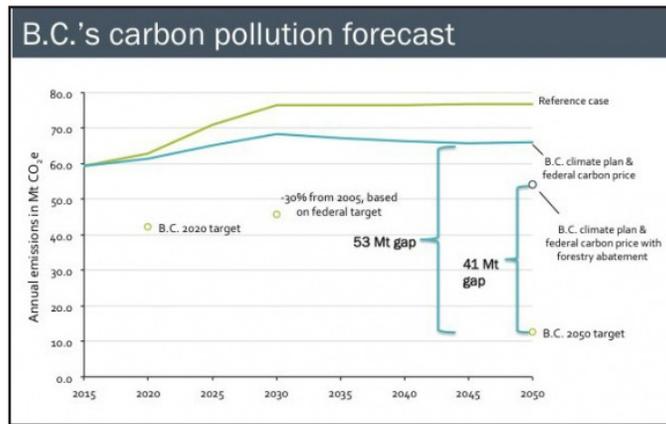
workshops, seminars, and outreach events within communities, our partner universities and schools, as well as attending science fairs and Globe 2016. A new-look and rebranding for our weekly news digest, The Climate Examiner, has enabled easier sharing of content

and its readership is growing.

On a personal note, I have had the privilege of connecting with inspirational people working in the climate field within our four PICS universities, government, industry and First Nations, in British Columbia and Canada. International connections for PICS were also an important part of outreach, through attending key climate symposia including as a member of the steering committee of the Global Climate Observing System, and being awarded an honorary doctoral degree from the University of Utrecht.

I would like to thank PICS researchers, governance and advisory committees, and especially our staff, for their tremendous effort in cementing PICS’ reputation for high quality work, integrity and accessibility.

Sybil Seitzinger



Forecast from "Modelling the Impact of the Climate Leadership Plan & Federal Carbon Price on British Columbia's Greenhouse Gas Emissions "

ABOUT PICS

The Pacific Institute for Climate Solutions (PICS) 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 Province of BC, 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).

In partnership with all levels of government, the private and the non-profit sector, PICS pulls together the intellectual capital of the province to apply a multi-disciplinary approach to climate change research.

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

- communicating climate change issues to government, industry and the public

Governance

The institute is governed by three bodies:

- The PICS program committee consisting of faculty researchers from PICS' 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)
- The executive committee made up of the four vice presidents of research from each PICS campus, an associate dean from UVic, the Head of CAS and a senior scientist from CCCMA
- The advisory board comprising leading community representatives from across the public, private and non-profit sector

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.



RESEARCH

Within a collaborative and inter-disciplinary framework, PICS supports a range of solutions-oriented research initiatives to assist BC in transitioning to a vibrant, low carbon economy. Current initiatives include five major policy-relevant projects developed under Phase II of the Strategic Research Plan, plus several dozen graduate and post-doctoral fellowships. PICS also commissions leading edge research from academics and experts from BC and around the world.

Research results form the basis for PICS white papers, specialist reports, briefing notes, 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 in government, industry, educators, the research community, media and the interested public.

PICS Major research initiatives

Five issues of critical importance to British Columbia— transportation, electrical grid integration, energy efficient in the built environment, forestry, and natural gas development—are the basis for PICS major research projects. The institute has committed \$1.5 million over a five-year term for each project. This funding is subject to each meeting interim progress targets.

These research teams are highly collaborative, and bring together experts from a range of disciplines and institutions, including local, provincial and federal governments, academia, industry, and First Nations, as well as graduate students and post-doctoral fellows.

Outside support and advice is provided for each team by an advisory panel containing representatives from the PICS executive, government, the business community and academia.

Outcomes from the “Big Five” include policy briefs, white papers, specialist reports, community and industry guides, media releases, conference presentations and master’s and PhD theses. Primary users of this information include policy-makers and planners at the provincial and municipal levels of government, the business community, climate-related researchers, community organizations, the media, researchers, and territorial neighbours.

The five projects are:

The 2060 Project: Integrated Energy System Pathways for BC and Canada

The 2060 Project explores the intersection of technology, policy, economics, and society on the decarbonisation of Canada’s energy system. The key strategy for decarbonisation is the development of a sustainable electrical system, which is used to substitute directly and indirectly for fossil fuel use across all sectors of the economy.

Examples of research topics analyzed by the 2060 Project during 2016 include the benefits of strengthened inter-provincial electrical integration, the potential of residual biomass in meeting Alberta’s renewable energy goals, the use of the natural gas system to support variable renewable sources, and the impacts of proposed carbon policies such as caps and pricing on electrical system structure.

The Pacific Institute for Climate Solutions: Big Five Research Projects



The 2060 Project: Integrating Canada's electrical grids.



BC Natural Gas Development: A "bridge fuel" to a low carbon future?



Forest Carbon Management: Supporting forest adaptation while maximizing economic value & carbon sequestration.



Energy Efficiency in the Built Environment: Designing, financing & operating buildings for net-positive energy gains.



Transportation futures: Designing low emissions pathways for BC's air, land & marine transport networks.

In addition to journal articles, presentations, and conference papers, research results are disseminated through Opinion Editorials, website blogs, PICS white papers, and social media. These different communication modes provide effective ways to digest findings and to educate a wide range of audiences on the complexities and challenges of energy system decarbonisation.

Project co-leads: Dr. Andrew Rowe, UVic, Professor, Mechanical Engineering, Dr. Peter Wild, UVic, Professor, Mechanical Engineering.
Project manager: Dr. Bryson Robertson.

The Forest Carbon Management Project

The Forest Carbon Management Project has released several publications on all three themes of its research; analyzing forest sector climate change mitigation options in BC and

the associated costs and benefits (Theme 1), quantifying responses of forest growth and mortality to environmental changes over the past decades as the foundation for forecasting future responses and designing regionally-differentiated mitigation portfolios (Theme 2) and compiling an analysis of policy gaps and barriers to implementing forest carbon mitigation activities in British Columbia (Theme 3). The close cooperation between universities, the BC Ministry of Forests, Lands and Natural Resource Operations, and the Canadian Forest Service has contributed to the success of the project.

Project lead: Dr. Werner Kurz, Senior Research Scientist, Natural Resources Canada, Canadian Forest Service.

Transportation Futures for BC

Transportation is BC's largest aggregate source of GHG emissions, and this project is identifying pathways to achieve sustainable low-or-zero emission transport options. Highlights during 2016 include a follow up to the 2013 Canadian Plug-in Electric Vehicle Survey and report, with the design and development of a new survey due for implementation in 2017. The survey will assess the consumer demand for alternative fuel passenger vehicles (e.g., plug-in electric and hydrogen).

Reviews of the state-of-the-art in refueling infrastructures for hydrogen and liquefied natural gas as well as initial deployment strategies for electric vehicles in BC have been completed. Significant deficiencies have been identified (e.g., lack of fugitive emission controls for liquefied natural gas stations). Some results have been published and some are pending.

The optimization of EV bus routes in Victoria, and large-scale integration of plug-in electric vehicles in smart grids has continued. Transit and energy authorities in British Columbia are currently utilizing this information.

A vehicle fleet life cycle assessment tool for hydrogen fuel cell vehicles with a variety of fuel production processes was developed. In the future, it will consider a wider range of passenger and freight fleets. These efforts have been reported as journal publications or conference presentations. All publications are hosted at <http://cerc.ubc.ca/tfbc/resources/>

Project lead: Dr. Walter Mérida, Director, Clean Energy Research Centre, UBC. Program manager, Dr. Omar Herrera, UBC.

Energy Efficiency in the Built Environment

This project is developing practical strategies and policy recommendations to increase energy efficiency in BC's built environment, which currently accounts for about 10 percent of provincial GHG emissions. During 2016 the project team has been undertaking cross-scale, multiple stakeholder, systems-based research:

The policy/finance stream is analyzing and modeling business and consumer technology choices to evaluate the effectiveness of different financing mechanisms and policy instruments to reduce carbon emissions in new and existing buildings. Informed by direct municipal stakeholder engagement, the work focuses on specific urban case studies to further shape recommendations.

The community stream is developing spatial models to understand the energy and emission impacts of policies for BC communities and neighbourhood-scale redevelopment plans. A complementary international review of best development practices and activities, together with engagement with municipal stakeholders, will offer recommendations applicable to BC.

The building stream is developing a comprehensive framework characterising the interconnections between the stakeholders, policies and mechanisms that shape the built environment so as to situate different initiatives. Specific projects are examining asset and energy assessment of existing buildings, energy benchmarking, innovative delivery processes and the rebound effect.

Project lead: Dr. Ray Cole, Academic Director, UBC Centre for Interactive Research on Sustainability (CIRS).

Project research manager: Angelique Pilon, UBC.

The Scale of Natural Gas Development & Maximizing Net Social Benefits

BC has an abundance of shale gas reserves currently earmarked for the development of a new liquefied natural gas (LNG) export market, yet there are many questions about how the scale and nature of development affects resource rents, GHG emissions, water supply and quality, and communities. This project aims to plug that information gap in four targeted areas: a) the economic analysis of markets for natural gas and returns to the province and British Columbians; b) investigating the types of energy sources planned to be exploited during LNG production and the realistic cost implications to industry of using renewable energy sources rather than burning gas (and therefore emitting GHGs); c) studying the cumulative impacts of natural resource development on northern communities; and d) analyzing emerging concerns over hydrological impacts, including the availability of groundwater under a changing climate, and water quality impacts from fracking.

Project lead: Dr. Nancy Olewiler, Director of the School of Public Policy, SFU

Projects affiliated under the Natural Gas theme:

Adaptation to Climate Change Team (ACT)

Climate change and other human impacts on the function of Earth's systems are now such that scientists are arguing that we have entered a new geological epoch, dubbed the Anthropocene. The resulting convergence of pressures and trade-offs at the nexus of water, food, energy and biodiversity poses significant challenges for society, and requires us to consider transformative responses. Examples of these can be achieved by aligning climate change adaptation and mitigation planning in an approach known as low carbon resilience (LCR). ACT published a report on LCR: *Transformational Climate Change Planning for Canada*, in June 2016, and a report outlining professionals' perspectives partly based on the results of a September 2016 workshop with BC thought leaders: *Climate Risk - Getting to Action*, in December 2016.

In late 2015 ACT released *The Climate Nexus: water, food, energy and biodiversity in a changing world*. ACT's second book on the nexus - *The Hard Work of Hope* - is due out in Fall 2017.

Cumulative and Community Impacts Research Consortium

The Cumulative Impacts Research Consortium (CIRC) based in Prince George has initiated seven projects in partnership with local/provincial government agencies, First Nations, civil society organizations and industry proponents to better understand the cumulative impacts of natural resource

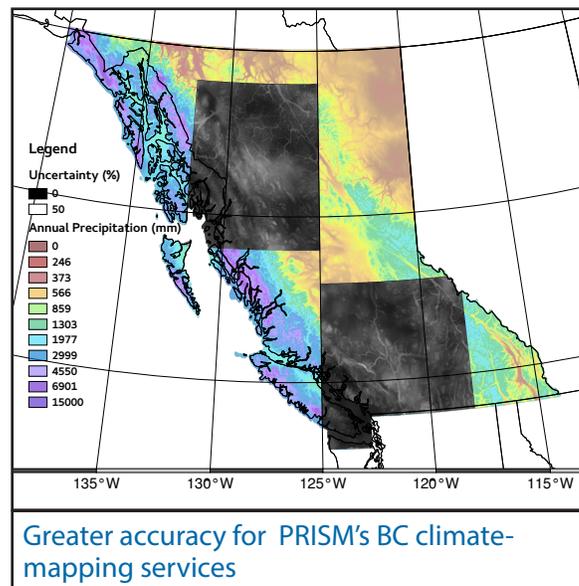


development across northern BC. The projects include a strong focus on the community impacts of unconventional natural gas and associated policy responses, knowledge syntheses on the health impacts of resource development, developing indicators for changes to the socioeconomic conditions of resource dependent communities, and a critical review of BC's cumulative effects policy frameworks. Holding community workshops is a key feature used to identify knowledge needs and co-create new tools for understanding cumulative impacts of multiple land uses in an era of global climate change. For more information on these and related projects, please visit www.unbc.ca/cumulative-impacts.

Affiliated Projects

PICS supports climate-related research outside the scope of its "Big Five" projects. Current projects include:

- A research team led by Simon Fraser University is working with public health agencies and scientists to identify mechanisms for preventing waterborne diseases arising from extreme precipitation events that affect Metro



Vancouver municipal water systems.

- Further advances have been made within the PRISM climate-mapping project by the Pacific Climate Impacts Consortium (PCIC), which provides high-resolution temperature and precipitation climatological data ranging in scope from

the back yard to the entire province of BC. New products tell users how accurate PRISM data are for any BC location.

Annual Forum

More than 100 PICS researchers, fellows, advisory board, executive and program committee members and staff, came together in Vancouver in October 2016 to learn about and discuss the latest findings from the institute's five major research projects. The forum began with an address from Susanna Laaksonen-Craig, Head of the Climate Action Secretariat, Ministry of Environment, who spoke about the BC Government's Climate Leadership Plan, and the value of timely policy-relevant research from PICS. The afternoon guest speaker was Caroline Caza, Regional Director General West and North at Environment and Climate Change Canada, who gave a federal perspective on

the issues and complexities Canadians face at this time. Participants at the forum cited its networking opportunities as particularly valuable for creating new collaboration, ties and information sharing between researchers of the “Big Five.”

Fellowships

PICS supported a total of 68 fellowships (both independent and project-related) across a wide range of disciplines during 2016. Twenty-nine graduate students were awarded fellowships through our annual call. These fellowships are valued at \$18,500 for two years at the master’s level, and \$21,000 a year for three years at the PhD level. Within its five major research projects, PICS also currently supports 31 graduate fellows and 8 post-doctoral fellows. These students are part of a team of researchers and scholars from an array of academic disciplines.

Since the fellowship program began in 2008, PICS has supported 19 post-doctoral fellows, and 125 graduate fellows at the masters and Phd levels with a total allocation of \$3,000,000.

Visiting fellowships are awarded on a periodic, short-term basis throughout the year. Dr Tsung Sheng Liao from National Chung Cheng University In Taiwan spent six weeks at PICS during summer 2016 examining how PICS operates with respect to its research program and administrative structure. Dr. Liao will present his findings to officials in Taiwan with the hopes of setting up a similar institute in that country.

Internships

Through its internship program, PICS provides funding for public sector and non-profit organizations to hire undergraduate and graduate students from PICS collaborating universities to work on climate change research and policy projects throughout BC. In 2016, four students took up positions with: the BC Climate Action Secretariat, the Ministry of Agriculture, the Ministry of Forestry and the Ministry of Energy and Mines. Respectively, their work was in the fields of economic analysis, climate action in the agricultural sector, forestry climate change research, and clean transportation research. For full details see Appendix 3. Since the program began, PICS has funded 87 internship positions for a total of \$900,000.

Publications

PICS research generates a growing body of knowledge in the form of white papers, specialist reports, briefing notes, books and/or chapters, conference proceedings, journal articles, theses and other publications on issues related broadly to climate change mitigation and adaptation. These publications are solutions-focused and can be used to inform and guide policy-makers, educators, researchers and the interested public. 2016 publications are available on the [PICS website](#).

A selection of publications produced in 2016 include the following:



White papers

To date, 30 white papers have been published by the PICS office. These peer-reviewed reports are authored by leading researchers and policy experts commissioned by PICS.



White paper author Reuven Sussman

White papers contain in-depth analysis and policy-relevant recommendations on a range of climate-related topics of key interest to British Columbia.

Social Mobilization: How to Encourage Action on Climate Change. Reuven

Sussman, Robert Gifford, and Wokje Abrahamse.

Briefing notes

Shallow Groundwater Intrinsic Vulnerability Mapping in Northeast British Columbia.

Shannon Holding and Diana Allen.

Hydroelectric vulnerability and climate change.

Leigh Philips – PICS science writer.

Journal Articles

- “Using multiple disparate data sources to map heat vulnerability: Vancouver case study” *The Canadian Geographer*. Mehdi Aminipouri, Anders Knudby and Hung Chak Ho.
- “A stochastic aerodynamic model for stationary blades in unsteady 3D wind fields” *The Science of Making Torque from*



PICS & CCCMA researcher Vivek Arora interviewed on Global TV

Wind - TORQUE 2016. Curran Crawford and Manuel Fluck.

- “Forest carbon mitigation policy: A policy gap analysis for British Columbia”, *Forest Policy and Economics*. George Hoberg, Guillaume Peterson St-Laurent, Gabrielle Schittecatte, Caren C. Dymond.
- “Potential near-future carbon uptake overcomes losses from a large insect outbreak in British Columbia, Canada”. *Geophysical Research Letters*. Vivek K. Arora, Yiran Peng, Werner A. Kurz, John C. Fyfe, Barbara Hawkins, Arelia T. Werner.

Theses

- *Designing Politically Acceptable and Effective Policies to Mitigate Climate Change.* Ekaterina Rhodes.
- *Spatial Influences of Heat Exposures and Social Vulnerability on the Temperature-Mortality Relationship: A Case Study in the Greater Vancouver Area.* Derrick Ho.
- *Off Track to 2050?: A study of Present and Future Interurban Transportation Emissions in British Columbia, Canada, Relative to its Greenhouse Gas Reduction Reduction Targets Act of 2007.* Alex Schare.
- *A Brighter Future: Solar Energy in BC An Application of Multiple Account Cost-benefit Analysis and Barriers Analysis.* Evan Damkjar.

Specialist Reports

- *Modelling the Impact of the Climate Leadership Plan & Federal Carbon Price on British Columbia's Greenhouse Gas Emissions.* Navius Research.
- *Final Report: Shallow Groundwater Intrinsic Vulnerability Mapping in Northeast British Columbia.* Shannon Holding and Diana Allen
- *Low Carbon Resilience: Transformative Climate Change Planning for Canada.* Edward Nichol and Deborah Harford, ACT: Adaptation to Climate Change Team, SFU.
- *This Green House II: Building Momentum on Green Jobs and Climate Action Through Energy Retrofits Across Canada.* C. Beresford and R. Duffy.

OUTREACH AND 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 majority of public lectures and panel events are live webcast and archived and available on the [events page](#) of 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 are predominantly held where the principal investigator is based – Vancouver, Victoria or Prince George.

Invited Speakers

In addition to its regular seminar and lecture series, PICS periodically hosts special public events with key climate change authorities from around the world. See Campus Updates section for speakers hosted during 2016. Most speeches are available for viewing on the PICS website video archive.

Fellowship Symposium

The PICS annual fellowship symposium is an opportunity for fellows to present their interim research results and learn about the work being undertaken by others working in the field of climate change solutions. This exchange of information always sparks lively discussion and fosters collaboration among the broad range of disciplines supported through this program.

This year's fellows (which include engineers, social scientists, economists, biologists,

atmospheric chemists, epidemiologists and computer scientists), met in Vancouver in May 2016. Among the presentations was research into the risks and opportunities of climate change to the agri-food industry, the development of floating offshore wind turbine platforms in BC, developing new materials for more sustainable cooling systems and using green infrastructure to minimize the impact of sea level rise.

The Climate Examiner

2016 saw the launch of [The Climate Examiner](#) (TCE), which brought a fresh modern look and sharable format to its predecessor, the PICS Climate News Scan. This weekly news brief offers tight, digestible explanations for policymakers, industry leaders and the informed lay public of the latest developments within climate science and energy systems, as well as related policy changes and clean-tech innovations. The Climate Examiner strives to be a technology-



PICS weekly climate news product, [The Climate Examiner](#), had a new look in 2016.

agnostic and non-partisan publication, whose only agenda is an evidence-based approach to climate solutions.

Newsletter

The [newsletter](#) is a regular publication

featuring the latest PICS research results, announcements and events, both past and upcoming.

Media Coverage

2016 was another busy year for PICS in the media, with widespread coverage of the institute's new research announcements and events by print, radio and television networks within British Columbia and beyond.

PICS people, research and events featured in the following print, online and broadcast

media in 2016:

Print & Agency:

Vancouver Sun, The Globe and Mail, The Times Colonist, CBC News, Metro News Vancouver, Huffington Post, The Province, The Toronto Star, The Ottawa Citizen, Yahoo News, CTV News, The Ring,



[Dr. Seitzinger](#) at the August 2016 launch of the [Climate Leadership Plan](#), where she presented an initial independent analysis of the plan, with Premier [Christy Clark](#) and Environment Minister [Mary Polak](#)



UVic featured PICS 2060 project researcher Benjamin Lyseng in its marketing campaign. Ben's research focusses on carbon policy and technologies to reduce emissions from energy systems.

The Martlet, The Prince George Citizen, The Georgia Strait, The Comox Valley Record, Policy Options, North Delta Reporter, BC Business Magazine, CBC on the Island,

Radio: CBC Quirk and Quarks, CFX 1070, News 1130, CHRQ News Talk 770, Roundhouse Radio 98.3, Moose FM, Fairchild Radio,

Television: CKPG TV

Blogs: Desmogblog, Clean Technica

Website and Social Media

The PICS website houses information on the institute's research activities and outcomes, news, events, publications, free climate-related education tools and videos, 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.

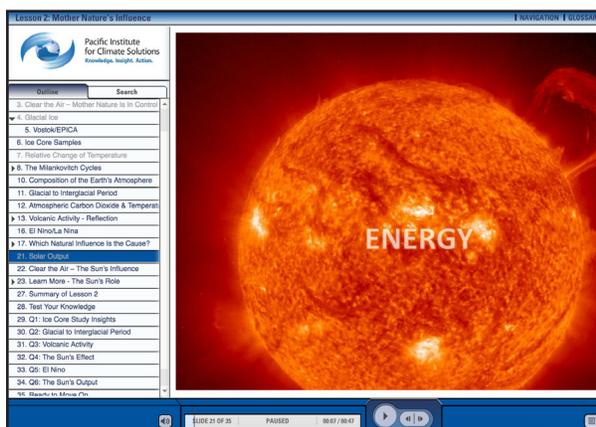
CAMPUS UPDATES

University of Victoria

As the host institution, UVic houses the central PICS office staff, including the executive director, administrators, and communications staff. The UVic staff are responsible for directing the institute's overall programming and outreach activities. This includes administering the PICS research, fellowship and internship programs; producing The Climate Examiner and white paper series; organizing PICS annual forums, lectures and other events; managing 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 each month. With a focus



PICS Education tools - Climate Insights 101

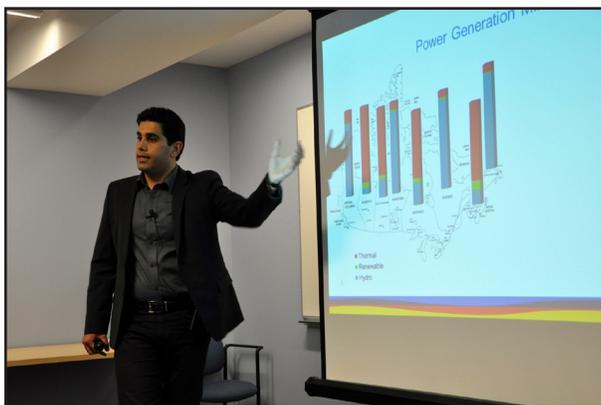
on climate science, regional impacts and potential solutions, seminar topics over the past year include:

- Robbie Hember – **Drought-related tree mortality: Heading into a century of more frequent and severe forest dieback events**
- Iman Moazzen – **Integrating energy pathways in British Columbia and beyond**
- Rod Davis – **Wildlife ecosystem resilience in the context of climate change: A Kootenay case study**
- Richard Hebda – **Dispersed adaptation to climate change: the heritage potato crop-climate project**

Public Outreach

Sponsored talks include:

- Susanne Moser – **Communicating Impacts and adaptation: Engaging Communities when Climate Change comes home**; Victoria, May.
- **Climate leadership panel** featuring Nancy Olewiler, Emanuel Machado, Merran Smith, Matt Horne, Jonathan Rhone and Shauna Sylvester. This



Iman Moazzen at his UVic talk on integrating energy pathways.



Ideafest: Hotter, Drier Summers? Implications and adaptations for BC.

public panel discussion provided an opportunity to hear from experts on BC's climate action options, and how to support the transition to a prosperous low-carbon economy; Vancouver, March.

- **Ideafest: Hotter, Drier Summers? Implications and adaptations for BC.** Moderated by Sybil Seitzinger, panelists included: Alan Dobb, Kim Hyatt, Robbie Hember, Anna Warwick Sears, and Johanna Wolf. Introduction from Trevor Murcock and Farron Anslow from PCIC. Victoria, March.

Sponsored UVic campus talks included:

- Francis Zwiers – **Changing extremes- is it real, or just imagined**; March.
- Tom Pedersen – **Responding to the Climate Change Challenge is a social imperative and an economic opportunity**; July.
- Trevor Hancock – **Climate change and Health: Impacts, Implications and Responses**; December.
- Johanna Wolf and Annika Bell (BC Climate Action Secretariat) – **Lunch and learn sessions Climate Resilient Buildings** ; Vancouver & Victoria, April.

Fellowships

The District of North Saanich Municipal Council has enlisted the help and research of **PICS UBC Fellow Tugce Conger**, as part of a major initiative to plan for climate change, particularly the local impacts of projected sea level rise.

Tugce's PhD research examines the potential of 'green infrastructure', such as saltmarshes, to minimize damage from sea-level rise and storm surge, in the Salish Sea region. Coastal vegetation can play an important role in strengthening coastlines against erosion (through roots binding soil), as well as elevating land and providing rough surfaces, thus attenuating waves and offering surge protection.

In May 2016 the council released a Flood Construction Level Study that found in the event of a storm with designated wind, storm surge and wave characteristics, 210 of the district's 715 waterfront lots could expect substantial flooding, with a further 74 also at risk unless action is taken. Tugce is working alongside climate



The first experts meeting North Saanich's Resilience Project, June 7, 2016: (L to R), Tugce Conger, Mayor Alice Finall, and councillors Heather Gartshore, Geoff Orr, Murray Weisenberger, Jack Thornburgh.

change adaptation experts from government, environmental law, non-profits and the community to develop the District of North Saanich Resilience Planning Project. Her key role will be creating maps that show the impact of flooding on parts of the North Saanich coastline, and also developing scenarios of how different green adaptation actions can influence flooding outcomes.

Declines in salmon populations in the Salish Sea are the impetus behind a project to better adapt fisheries management strategies to changing environmental conditions. **PICS UVic fellow Lia Chalifour** is partnering with the

Raincoast Conservation Foundation to take a closer look at how fish use different habitats within the Fraser River estuary.

Juvenile salmon from 56 conservation units migrate through the river annually, but it is not well understood how they use different habitats within the estuary. Sand flats, dense eelgrass meadows, and salt marshes

provide different benefits, as well as offer potential carbon uptake. The goal is to demonstrate habitat use patterns, and to evaluate salmon health by analyzing growth rings on their otolith bones.

Results from this study will contribute to the Salish Sea Marine Survival Project, an



Lia Chalifour and the research team use a custom built purse seine, a 40-meter fishing net, to scoop up small fish to measure their health.

agreement between the US and Canada to recover shrinking Chinook and Coho populations.

Living on three continents gave **PICS UNBC fellow Alex Schare** a unique perspective on global issues, especially climate change. Born in Germany, Alex moved to Williams Lake as a teenager and lived in Osaka, Japan as a student. He moved to Prince George to attend UNBC, where he completed degrees in International Studies, and has now earned his PhD from the Natural Resource and Environmental Studies program. "BC is an especially interesting place to study transportation because it's got unique challenges, like large size and low population density."

Alex's dissertation, which he defended in February, is titled "Off track to 2050? A study of present and future interurban transportation emissions in British Columbia, Canada, relative to its greenhouse gas reduction targets act of 2007." It's the first study of its kind that uses emission factors based on actual fleets in BC. It shows emissions levels, where they are, and how they compare between modes.



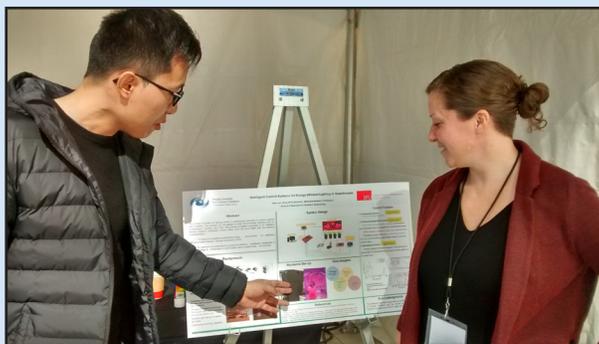
PICS UNBC Fellow Alex Schare's research is the first to calculate emissions from actual BC vehicle fleets

Alex's study will allow policymakers to identify 'the worst offenders', and areas that have the highest reduction potential.

Research conducted by **PICS SFU fellow Alex Jiang** aims to optimize plant growth in greenhouses by using intelligent control systems for energy-efficient lighting.

His proposed system—which comprises an intelligent sensor network, distributed control nodes, and LED grow lights—has two main goals: reducing supplemental energy consumption by optimizing LED grow-light intensity through automated controls, and improving crop productivity by using the spectrum modification capabilities of LED technology to manipulate the light quality.

A mini greenhouse has been set up in the lab and Alex is currently working on the design of the control system. So far the data show a 40% increase in the crop quality control precision, 30% cultivation time reduction and energy savings of at least 70%. Alex presented a poster of his research at the 2016 Greater Vancouver Clean Technology Expo and Championship.



Alex Jiang presenting at Vancouver's Clean Tech Expo

University of Northern British Columbia

(Summary provided by PICS UNBC program manager, Michelle Connolly)

UNBC activities in 2016 fell under the rubrics of research, innovation, outreach, and events. PICS UNBC program manager Michelle Connolly promoted research fellowships and internship opportunities, supported the work of program committee members and fellows, and raised PICS' academic and community profile through the delivery of targeted events and the dissemination of research findings. Highlights from 2016 include:

- Sybil Seitzinger visited UNBC and presented a public lecture on the **outcomes of the COP 21 climate talks**. A feature story in the Prince George Citizen capped off Sybil's first visit to Prince George.

- PICS in collaboration with UNBC researchers Zoë Meletis and Mark Groulx and the Two Rivers Art Gallery launched a new project entitled **Art, Change & Creativity (ACC)**. The ACC

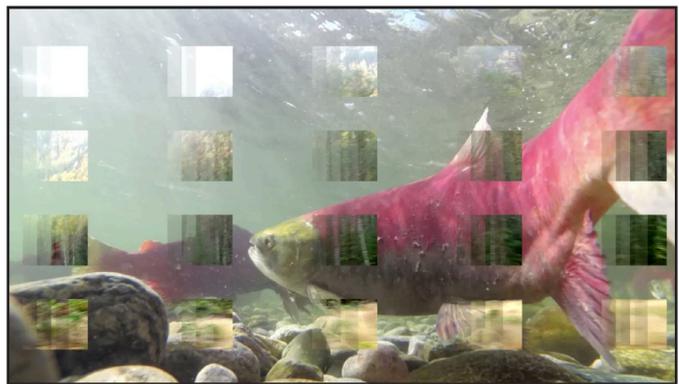


Michelle Connolly, interviewed on CKPG News

project was developed in response to PICS' special report on social mobilization and its call for increased efforts to integrate climate change discussions into existing communities to effectively mobilize the public on mitigation and

adaptation. ACC is part research, part community engagement and part mini-podcast generation, and explores new ways of knowledge sharing and social mobilization in northern BC by hosting art-based activities and conducting research with creative communities.

- A joint UNBC-SFU public event on **BC's pending Climate Leadership Plan** featured speakers from the Pembina Institute and SFU. After a lively discussion participants submitted



L: Michele J Jensen (2016) Memory of the Draining, R: Ruth Beer (2015) Intersections (video still). Images from the Art, Change & Creativity project with the Two Rivers Gallery

written comments on the proposed plan to the Government of BC.

- The head of PICS Forest Carbon Management Project, Werner Kurz, presented his research to an audience of UNBC faculty and researchers, government science and policy staff, and also connected with forestry graduate students.
- PICS is collaborating with Guido Wimmers (Associate Professor of Integrated Wood Design MEng program) and the Green University Planning Committee to build an innovative shelter at the UNBC bus loop. The public-use bus shelter will showcase the use of local products and innovative wood construction, as well as several key elements used in passive designed buildings.
- PICS provided support for two specific events featuring female scientists and leaders for **Inspiring Women Among Us** in 2015 and 2016. Claire Martin, former national CBC TV weather analyst, presented on her experiences representing Canada at the 2015 Paris Conference on Climate Change.

Michelle spoke at the following community events and class lectures, beginning all talks with a description of PICS' mission, mandate and opportunities for students:

- Guest lectures for UNBC courses in environmental studies, natural resource management and climate science
- Community open-house meetings as part of the public contribution to **Have your say on climate change**, the Government of Canada's public input process.
- Winston Breakfast Group speaker series
- Public lecture **Science and Politics in Canada** featuring climate scientist Dr. Andrew Weaver
- Panel discussions for northern film screenings of **This Changes Everything** and **Fractured Land**
- Michelle conducted several media interviews with CKPG TV, 250 News and Vista Radio about the Health Educators Climate Commitment, Canadian commitments at COP 21, and the Joint US-Canada statement from Prime Minister Justin Trudeau and President Barack Obama on methane reductions in the oil and gas sector.

University of British Columbia

(Summary provided by PICS UBC program manager, Sara Muir Owen)

Knowledge mobilization, communication and energy efficiency in the context of climate change science and research were key themes for PICS-UBC through 2016. A wide range



of events was supported, featuring PICS researchers, UBC faculty, and other leading climate change experts from Canada, France, Germany and the United States. PICS UBC program manager Sara Muir Owen co-hosted public events, attended a number of conferences, gave presentations, and fostered partnerships on and off campus, leading to many successful initiatives at the UBC campus and beyond. A few of this year's highlights include:

- Co-hosting Canadian author and climate change activist, Naomi Klein in the spring of 2016 at UBC in partnership with UBC Reads Sustainability, the Liu Institute for Global Issues and the Irving K. Barber Learning Centre.
- Coordinating with the French Consulate on a FACTS (French Ameri-Can Climate Talks) **Biodiversity and Innovation** talk, moderated by CBC's Dominique Arnoldi, with entrepreneur Ross Beaty and a panel of Canadian and French scientists, Daniel Pauly, Jedediah Brodie, Raphael Lami, Alexandre Cluchier and Colleen Giroux-Schmidt.
- Partnering on new climate change knowledge mobilization projects, featuring **lessons learned from Germany's Energiewende;** digital tools

for youth engagement; and radio documentaries on PICS "Big Five" research projects. Two of these projects are based at UBC, while one is in partnership with the University of Calgary.

- Partnering with UBC Alumni on the UBC Dialogue: **Can developing nations lead the movement towards climate solutions?** The event was moderated by CBC's Lisa Johnson, featuring UBC faculty Simon Donner, Sumeet Gulati and Martino Tran, alongside PICS executive director, Sybil Seitzinger at a public talk.
- Partnering with the Institute for European Studies at UBC, and the German Embassy to help host the conference **Managing Decarbonization - The Cases of Germany and Canada.** Keynote speakers included Fazil Mihlar, Deputy Minister of BC's Ministry of Environment, Franzjosef Schafhausen, Deputy Director General for

Environment and Energy, German Federal Ministry for the Environment, and Peter Robinson, CEO David Suzuki Foundation. The conference also included talks by faculty from UBC and SFU, as well as University of Graz and Berlin, Carlton,



Students at Laura Secord Elementary School collaborating on a climate solutions poster, part of the PICS UBC community outreach program

- Harvard, Montreal, Newcastle University and others.
- Sponsoring EcoDistrict’s **District Energy + Water Academy** at CIRS, UBC, which brought executive-level project teams and leaders together to address core challenges in district-scale project feasibility, financing, policy regulations and marketability through intensive executive level peer-learning workshops.
- Facilitating at the **Pathways to Net-Zero Buildings in British Columbia. Thought leader forum: Accelerating deep retrofits** hosted by the Pembina Institute. The forum brought together representatives from all levels of government, the building industry and trades, utilities, research and NGOs, to establish “consensus on the regulatory roadmap to net-zero ready new buildings in BC, and to provide policy recommendations” for a Canada-wide building retrofit strategy.

- Working with the UBC Sustainability Initiative to host a series of climate change related “lunch-and-learns” on timely topics, including the BC Climate Leadership Plan, a comparison of household greenhouse gas emissions in Canadian cities, and the 2016 UN climate negotiations in Marrakech,



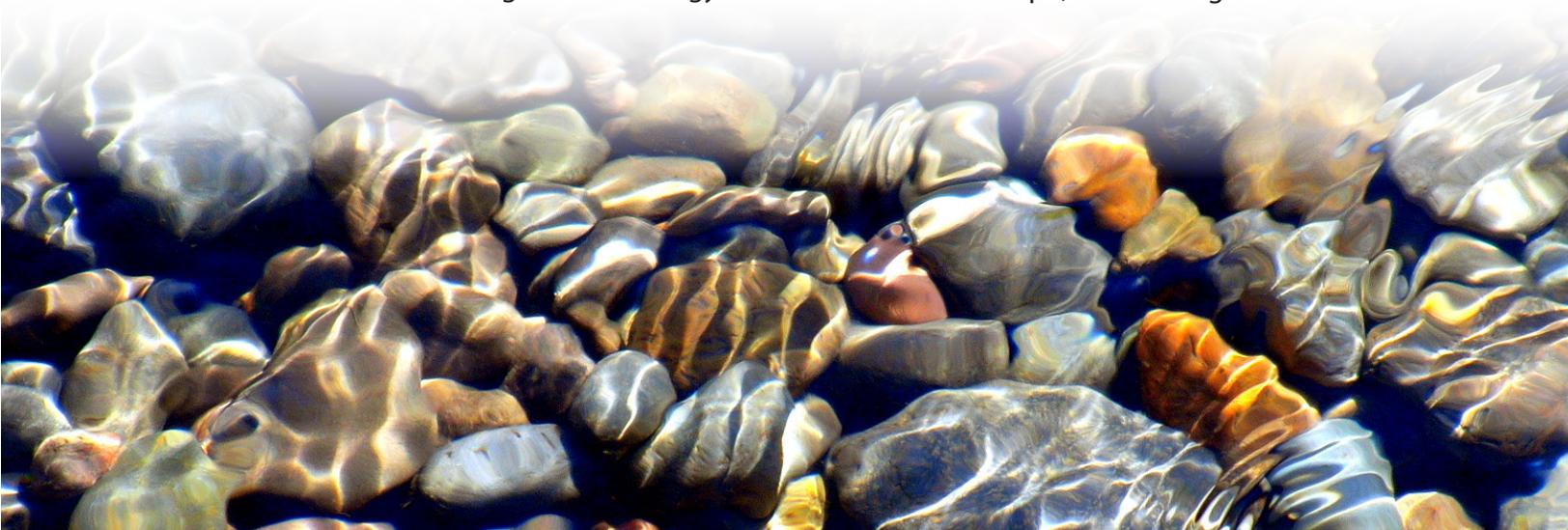
Sara Muir Owen at the COP22 UN climate conference in Marrakech

Morocco. The talks featured a number of UBC climate experts including James Tansey, John Madden, Sumeet Gulati, Juan Ferricio and Simon Donner, alongside others from outside of UBC—Matt Horne from Pembina Institute and Lucian Go, Fox International Fellow from Yale University.

Simon Fraser University

(Summary provided by PICS SFU program manager, Nastenka Calle)

Supporting climate solutions research, raising awareness and inspiring action through public events were central priorities for PICS-SFU in 2016. Highlights of this year include: co-hosting public events in collaboration with other groups on a wide variety of climate related topics; co-sponsoring GLOBE 2016 Conference and Innovation Expo; and hosting the



educational outreach program on Energy and Climate led by Nastenka Calle, PICS SFU Program Manager.

- PICS-SFU partnered with Green Tech Exchange – SFU Innovation Office to sponsor the **PowerHaus Pavillion at the Globe 2016 Conference and Innovation Expo**; over 25 Canadian companies shared their diverse range of clean-tech innovations. PICS featured its major research projects, and researchers Elicia Maine, Suzanne Goldberg and PICS alumnus Vinu Rajus showcased their research related to low carbon transportation, and energy conservation.



Suzanne Goldberg, Geoff de Ruiter and Nastenka Calle at the PICS booth at the Globe 2016 PowerHaus Pavilion

- **Increasing hazards due to climate change workshop:** this workshop aimed to identify the challenges and

needs of different sectors that deal with impacts from climate induced hazards such as sea level rise, wildfires, flooding and droughts. Sponsored by PICS-SFU together with SFU-Centre for Natural Hazard Research, ACT-SFU, and the Geological Survey of Canada.

- In March PICS-SFU and PICS-UNBC co-hosted a talk about BC's Climate Leadership Plan consultation, **BC's future Climate Leadership Plan: What YOU can do.** Matt Horne, Pembina Institute and Jonn Axsen, SFU gave an overview of the Climate Leadership team recommendations, sharing insights on how to make the plan effective.

- In 2016 PICS-SFU continued sponsoring the Carbon Talks public dialogues, a series of talks on climate change



related topics. A few highlights of this year include: **Vancouver's Renewable City Strategy; Effective Climate Leadership: Lessons from Germany; Climate Action in BC; COP 22 – Is the Paris agreement on track?** The talks received 2,200 views via YouTube.

- In June PICS-SFU and SFU co-hosted a research retreat with the goal of exploring new collaborations and opportunities in climate and energy research. The **SFU Climate Futures Initiative Research Retreat** gave researchers the opportunity to share ideas and build cross-disciplinary partnerships.
- SFU and PICS-SFU hosted a dialogue in October entitled **Laudato Si + 1: Faith, Business and Climate Change**, which brought together faith, business, city and academics leaders to discuss climate change. The dialogue focused on Pope Francis' encyclical "Laudato Si: On care for our common home". Panelists J. Michael Miller, Archbishop of Vancouver; Anne Giardini, SFU Chancellor; Andrea Reimer, City of

Vancouver; Praveen Varshney, Varshney Capital Corporation; Paul Kariya, Clean Energy BC; and Sybil Seitzinger, PICS, shared their thoughts on caring for our planet and the urgent need to tackle environmental degradation, climate change and poverty.

- **Exploring Energy Workshops:** Since 2011 PICS-SFU and SFU-Science in Action have been running this workshop series aiming to mobilize youth on energy and climate change issues. The program, designed for Grade 4-8 students, teaches energy conversion, consumption and conservation, and the GHG effect. This year the program reached 19,500 people.



FINANCIAL REPORT

The PICS endowment income fund performed well throughout 2014 resulting in a spend rate of 4.5% for the fiscal year 2015-2016, a budget of \$3.4 million. The majority of PICS annual budget, 56%, was spent in support for our graduate fellows and major research initiatives.

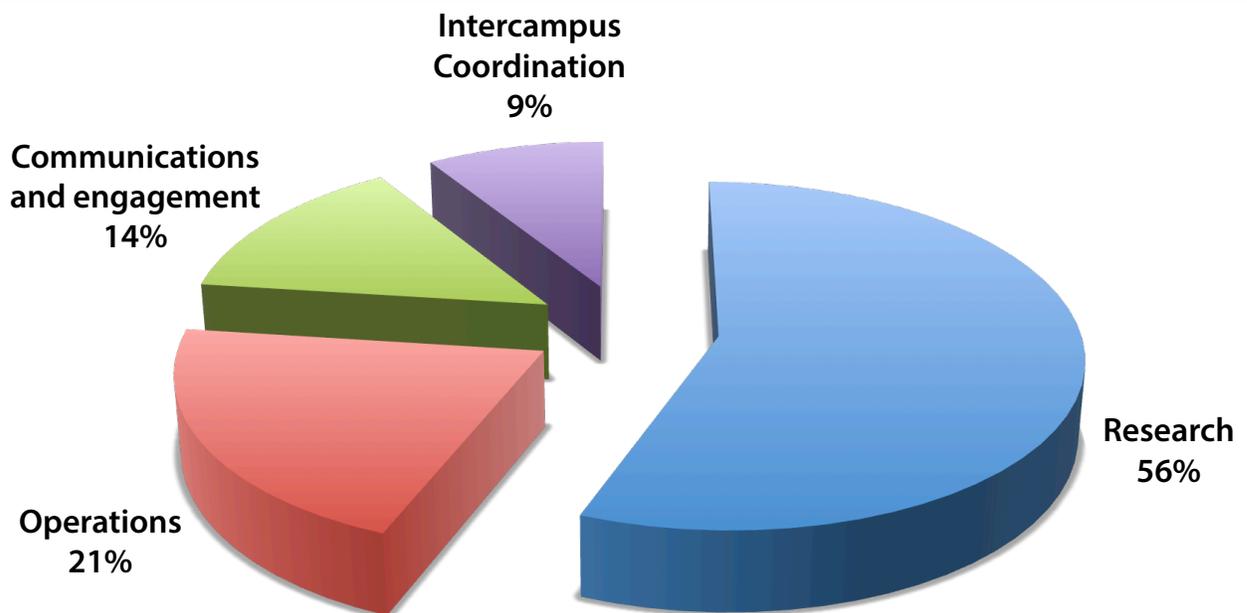
Budget categories include support for:

Research: The five major research projects, fellowship students, intern student funding, and unsolicited proposals and white papers.

Operations: UVic overhead, salaries and administrative costs.

Outreach and communications: PICS lecture series and hosted events, the weekly news scan, short courses, sponsorships and the PICS annual forum.

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



APPENDIX 1: GOVERNANCE

Board and Committee Membership: January 1, 2016 to December 31, 2016

Advisory Board

Michael Miller, Associate Vice-President Research, UVic (Chair) to June 2016

Oliver Schmidtke, Acting Associate Vice-President Research, University of Victoria (Chair) from July 2016

Lori Ackerman, Mayor, Fort St. John

Mark Edwards, Director, Environment, Teck Cominco Ltd.

Graham Kissack, External Consultant, Sustainability, Catalyst Paper Corporation

Gordon Lambert, former Vice-President, Sustainable Development, Suncor Energy (retired)

Randy Reinmann, Director Energy Planning, BC Hydro

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)

Geoff Payne, Acting Vice-President Research, UNBC,

Nathan Gillett, Chief Scientist, Canadian Centre for Climate Modelling and Analysis

Joy Johnson, Vice President Research SFU

Susanna Laaksonen-Craig, Head, Climate Action Secretariat, BC Ministry of Environment

Michael Miller, Associate Vice-President Research, UVic, to June 2016

Oliver Schmidtke, Acting Associate Vice-President Research, UVic from July 2016

Michael Masson, Associate Dean, Faculty of Social Sciences, University of Victoria

Sybil Seitzinger, Executive Director, PICS

Helene Burt, Vice-President Research and International UBC, from June 2016

Program Committee

Sybil Seitzinger, Chair - Executive Director, PICS

Stephanie Bertels, Assistant Professor, Technology, Operations Management/Innovation & Entrepreneurship, SFU to June 2016

Megan Holden, Associate Professor, Urban Studies and Geography, SFU, from November 2016

Brian Menounous, Professor, Canada Research Chair in Glacial Change, UNBC, on sabbatical October to December 2016

Stephen Dery, Canada Research Chair in Northern Hydrometeorology, UNBC from October to December 2016

Greg Flato, Research Scientist, Canadian Centre for Climate Modelling and Analysis, Environment Canada

Robert Gifford, Professor, Department of Psychology, UVic

Zoë Meletis, Assistant Professor, Geography, UNBC to September 2016

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

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

Curran Crawford, Professor, Department of Mechanical Engineering, UVic

Kirsten Zickfeld, Associate Professor, Department of Geography, SFU, on sabbatical to January 2017

Tim Takaro, Associate Professor, Faculty of Health Sciences, SFU, August to December 2016

Thomas White, Manager, Science and Adaptation, CAS, British Columbia Ministry of Environment

Mark Groulx, Assistant Professor, Environmental Planning University of Northern British Columbia

APPENDIX 2: PICS FELLOWSHIP HOLDERS

Graduate Fellowships holders 2016

Simon Fraser University

Mehdi Aminipouri, PhD Candidate, Geography: Modifying the urban surface energy balance in British Columbia's urban neighborhoods.

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

Khorshid Fayazmanesh, PhD Candidate, Mechatronic Systems: New graphite doped adsorption composites for adsorption cooling systems.

Mikela Hein, Master's Candidate, Resource and Environmental Management: Harmonization strategies for British Columbia's climate policies.

Derrick Ho, PhD Candidate, Geography: Spatial influences of heat exposures and social vulnerability on the temperature-mortality relationship: A case study in the Greater Vancouver area.

Alex Jiang Jun, PhD Candidate, Chemical and Biological engineering: Smart spectrum control categories for LED lighting in greenhouse farming..

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

Tugce Conger, PhD Candidate Institute for Resources, Environment and Sustainability: Green Infrastructure as a resilience building tool to reduce coastal flooding risks.

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

Thor Jensen, PhD Candidate Institute for Resources, Environment and Sustainability: The adoption of ground source heat pumps at multiple scales in North America.

Cher King-Scobie, PhD Candidate, School of community and regional planning, Post-disaster land use changes as a climate adaptation strategy.

Stefan Pauer, PhD Candidate, Law: Border tax adjustments in support of domestic climate policies: Explaining the gap between theory and practice.

Robert Tsin, Master's Candidate, Population and Public Health: Microscale heat variability mapping in greater Vancouver.

Haoqi Wang, PhD Candidate, Chemical and Biological Engineering: Integrated agricultural system incorporated with waste-to-energy conversion.

University of Northern British Columbia

Talaat Bakri, PhD Candidate, Natural Resources and Environmental Studies, Assessing offshore wind power production in British Columbia.

Geoff de Ruiter, PhD Candidate, Environmental science/engineering: Comparing industrial biochar applications: Optimizing revenue versus CO₂-equivalent emissions reductions or carbon sequestration.

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

University of Victoria

Lia Chailfour, MSc Candidate, Biology: Evaluating the importance of habitats to the resilience of resident fish communities and juvenile salmon in the Fraser River Estuary

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

Karine Lacroix, Master's Candidate, Psychology: Worldviews and barriers to pro-environmental behaviour.

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

Saeed Rahman, PhD Candidate, Business: The Agri-food industry of British Columbia: Adaptation to impacts and risks, and opportunities from climate change.

Lajevardi Seyedmotjaba, PhD Candidate, Mechanical Engineering : Can natural gas play a role in the transition to a low carbon system for road freight transportation in BC?

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

Markus Sommerfield, PhD Candidate, Mechanical Engineering, Airborne Wind Energy: Generation and Implementation.

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.

Charlotte Whitney, PhD Candidate, Environmental Studies: Adaptive capacity and marine conservation planning in the face of climate change.

APPENDIX 3: INTERNSHIP STUDENTS

Ministry of Forests Lands and Natural Resource Operations

Xudong Bao, UBC, Forestry

Ministry of Agriculture

Susanna Klassen, UBC, Land and Food Systems

Ministry of Energy and Mines

Marina Melanidis, UBC, Forestry

Climate Action Secretariat

Douglas Bryan, UBC, Economics

APPENDIX 4: PICS STAFF

Dr. Sybil Seitzinger, Executive Director

Megan Jameson, Administrative Officer

Robyn Meyer, Sr. Communications Officer

Nancy Chan, Executive Assistant

Stephanie Inman, Communication Assistant and Event Coordinator

Leigh Philips, Science Writer

Michelle Connolly, Program Coordinator - University of Northern British Columbia from September 2015

Kyle Aben, Program Coordinator-University of Northern British Columbia to June 2015

Nastenka Calle, Program Coordinator-Simon Fraser University

Sara Muir-Owen, Program Manager-University of British Columbia

Annual report production and layout: Robyn Meyer, Megan Jameson and Stephanie Inman

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