

## Integrated Proposal to Tackle Canada's Climate Change Challenges

SUBMISSION TO ENVIRONMENT AND CLIMATE CHANGE CANADA'S PUBLIC CONSULTATION PORTAL:  
**ACT** (THE ADAPTATION TO CLIMATE CHANGE TEAM), SCHOOL OF PUBLIC POLICY, SFU

### KEY RECOMMENDATIONS

#### 1. Recognize the urgency.

Changes to the composition of the atmosphere, loss of biodiversity and growing water demands are accelerating changes to the global water cycle. This is reducing water security for a wide range of uses in every region of Canada and resulting in increasing economic damage. As the atmosphere warms, it has greater capacity to hold water vapour, thus magnifying potential impacts. Addressing climate change requires urgent and persistent on-going policy attention.

#### 2. Undertake multiple solutions to managing the nexus of water, food, energy and biodiversity.

The intersection of water, food and energy systems with loss of biodiversity has become an accepted platform for reconciling sectoral interests. But we face so many overlapping and intersecting interests we can no longer afford to fix them one at a time or in isolation to one another. Future development must be ecologically and socially restorative to increase benefits associated with proper functioning natural systems. More attention must also be applied to understanding how impacts of climate change affect our fragile political systems, vulnerable global economy and already tense international relations in a crowded and warming world.

#### 3. Set a binding target for Canada to become carbon neutral by mid-century.

This is the aspirational goal of the Paris Agreement and Canada should take a leading role in its achievement. This requires integrating the reduction of GHG emissions with adapting to the effects of climate change, a combination we have termed Low Carbon Resilience. Some of the resources associated with pricing carbon should be applied to undertaking the integrated solutions outlined above. These involve protecting and restoring ecosystems to increase carbon absorption; urban planning that combines emissions reduction and adaptation measures; policies for eco-agricultural practices that protect biodiversity; water conservation; maintaining carbon resilient soils and greatly reducing food waste. It also means shifting from centralized energy supply infrastructure to distributed business models based on renewable energy, reduced marginal costs due to rapidly changing technology, and demand management.

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*ACT published **The Climate Nexus – Water, Food and Energy in a Changing World** in 2015, focusing on the crisis in the Nexus and its implications for the Canadian economy. The sequel will be published in Fall 2017 and will examine how we can manage the Nexus. The recommendations in this brief provide a preview of this book. Details of policies required to implement the recommendations are included in the following **Technical Briefing**.*

## ACT TECHNICAL BRIEFING ON KEY RECOMMENDATIONS

### 1. Recognize the urgency.

The Government of Canada now has to address the urgent situation associated with permanent and progressive changes to the hydro-climatic regime across Canada. As Arctic sea ice melts, the slower and wavier the jet stream becomes; the more erratically it behaves, the more unpredictable the weather becomes. In combination with the atmosphere's capacity to hold more water vapour as global warming proceeds, both summer storms and winter snows are already persisting longer and causing greater and greater damage. It is now not unusual for what was once considered a month's rain to fall in a few hours, overwhelming outdated or inadequately maintained storm infrastructure. Government costs to restore services and repair and upgrade infrastructure are rising exponentially.

Changes to ocean conditions also reinforce the need for urgency. Not only do we face the prospect of increasing sea levels, but oceans are also acidifying, surface layers are warming, and algae blooms are growing. Our fisheries face the daunting prospect of depletions in marine production and warming, drying and eutrophication with potential threats to food webs in freshwater environments.

There are bound to be surprises as the trajectory of climate impacts unfolds. Many of these surprises will be non-linear resulting in rapid, unpredicted and potentially irreversible changes to both the physical climate and social systems. At present, much of the research on climate damage is focused on easier-to-characterize changes, such as those associated with the threat of sea level on coastal cities; potential impacts of extreme weather events on expensive infrastructure; or the effects of warming mean atmospheric temperatures on precipitation and water supply, but these are not the full picture. The more pressing questions relate to how climate disruptions of these kinds will more immediately impact our fragile social fabric, political institutions, vulnerable global economy and already tense international relations. If we are to get through the climate bottleneck, we must ask and answer these harder questions also.

Our data collection, storage, and sharing capacity must be significantly bolstered on all fronts to assist in effective and multi-dimensional planning to facilitate adaptation to these needs and future conditions.

### 2. Undertake multiple solutions to managing the nexus of water, food, energy and biodiversity.

The Climate Nexus – the intersection of water, food, energy and biodiversity – is the cornerstone of sustainable communities in Canada. In order to protect this nexus, we need to standardize both environmental accounting practices and environmental regulations globally, starting with water. To achieve this end, it is important to incentivize an acceleration of reform that is already advancing of both the engineering and planning professions. All future development must seek double, triple, if not quadruple benefits in terms of the restoration of fundamental Earth system functions as reflected in biodiversity stability, efficient water use, soil vitality, carbon storage, and human and planetary health.

Responses to changing hydro-climatic regimes will have to become multi-dimensional. It will not be sufficient just to redesign physical infrastructure: risk assessment must also deal with population health and migration; consider how foreign aid might alleviate issues in the international context; and cope with questions regarding ways vulnerable populations in Canada can be assisted. Canada's trade policy will also have to be revised; if

there is to be a global response to climate change, Canada must consider reciprocal carbon reduction strategies when negotiating international trading arrangements.

All levels of government and industry will have to thoroughly revise their risk assessment approaches in order to map their exposure to extreme events using new forecasts of hydro-climatic variability. New policies will be required to insure against catastrophic weather events and to integrate natural systems with engineered infrastructure. The federal and provincial governments should assist local governments in building their capacity to implement these new policies.

Multi-national corporations will be required to examine the resilience of their supply chains as well as the impacts they are having on global systems based on their operating practices.

### **3. Set a binding target for Canada to become carbon neutral by mid-century.**

This target means that any carbon emissions must be offset by increased carbon absorption by natural or man-made systems. We must consider carbon reduction and adaptation policies simultaneously to create synergies. One example is to direct a portion of the funding generated by carbon pricing to pay for public investment in adaptive and resilient infrastructure.

#### **THE FOLLOWING TRANSFORMATIVE POLICIES WILL BE REQUIRED TO MEET THESE GOALS:**

#### **Protect and maintain 50 percent of natural biodiversity in healthy condition.**

Functioning ecosystems provide a wide range of ecosystem services such as flood control, drought management, carbon absorption, and benefits to public health as well as property values. Not only do we have to reverse a century of ecological mismanagement due to damaging development practices, but we must also restore degraded ecosystems as part of a new development ethic. We must encourage the private sector to pay for ecosystem services where it is part of a new business case for cost and damage avoidance. Green infrastructure is a natural asset and should be valued and included in asset valuation and management for all levels of government.

#### **Shift to eco-agricultural practices by 2030.**

Though current farming systems supply large volumes of food efficiently to global markets, they do so at an increasing price: widespread degradation of land, water and ecosystems; high emissions; biodiversity loss; and health impacts due to loss of micro nutrients, as well as increasing levels of obesity and diet-related diseases.

Another agricultural revolution is required; one that focuses on the integration of water, food and climate security and replaces uniformity with diversity; encourages holistic farm practices that retain carbon in the soil; rebuilds biodiversity; increases yields during droughts; and improves diets. A new national water ethic is also required; one that drives conservation; proper pricing of water use; protection of ecological flows; ensures that water is fit for purpose, and reuses treated wastewater.

#### **Shift to distributed energy systems based on renewable sources by than 2030.**

Rapid cost reductions in renewable energy systems, development of battery storage capacity, practical and cost efficient electric vehicles, and smart monitoring facilities will reduce marginal costs of renewable energy and transport systems to near zero within 20 years, making distributed sources of electricity more efficient than large scale transmission systems.

The advent of zero marginal costs, rapid advances in electrical and transportation technology, and a shift to a sharing economy and universal smart digital technology providing almost universal real time information will transform the current capital-based energy systems to a new model where consumers drive the societal choices that governments formerly made through regulations and policy changes.

### Universal education.

The quickest way to advance the transformations outlined in this brief, and thereby meet the urgency for making the shift to a low carbon resilient economy, is through universal education for all consumers. Such education should be included in all school and post secondary curricula; should be universally provided to all students and should include experiential learning both in the home and in nature.

Mobile apps that track real time energy, water and food use by consumers are in development. Once these become universally available, every consumer will be able to track their nexus demands for water, food and energy and can therefore be encouraged to reduce their footprint. The federal government could stimulate development of such technology and showcase Canadian expertise in the process.

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**ACT (the Adaptation to Climate Change Team), at SFU's School of Public Policy in Vancouver, Canada, was created in response to the challenges and opportunities facing Canadians as a result of the commitment to climate change due to past, current and future emissions combined with other widespread environmental challenges. For the past ten years, ACT has led the field in Canadian adaptation research, bringing leading experts from around the world together with industry, community, NGO and government decision makers to explore the risks posed by climate change and identify opportunities for sustainable adaptation.**

*ACT focuses on top-of-mind climate change impact areas including biodiversity, extreme weather, energy, water security, crops and food supply, sea level rise, health risks, population displacement, and new technologies, and a variety of related research initiatives. Our findings have stimulated new policymaking and much public interest. Our 2015 report, **Paying for Urban Infrastructure Adaptation in Canada**, received national acclaim. Other ACT reports providing federal policy analysis include: **Climate Change Adaptation and Extreme Weather (2009)**, **Climate Change Adaptation and Water Governance (2011)**, **Climate Change Adaptation and Canada's Crops & Food Supply (2012)** and **Low Carbon Resilience: Transformative Climate Change Planning for Canada (2016)**.*

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