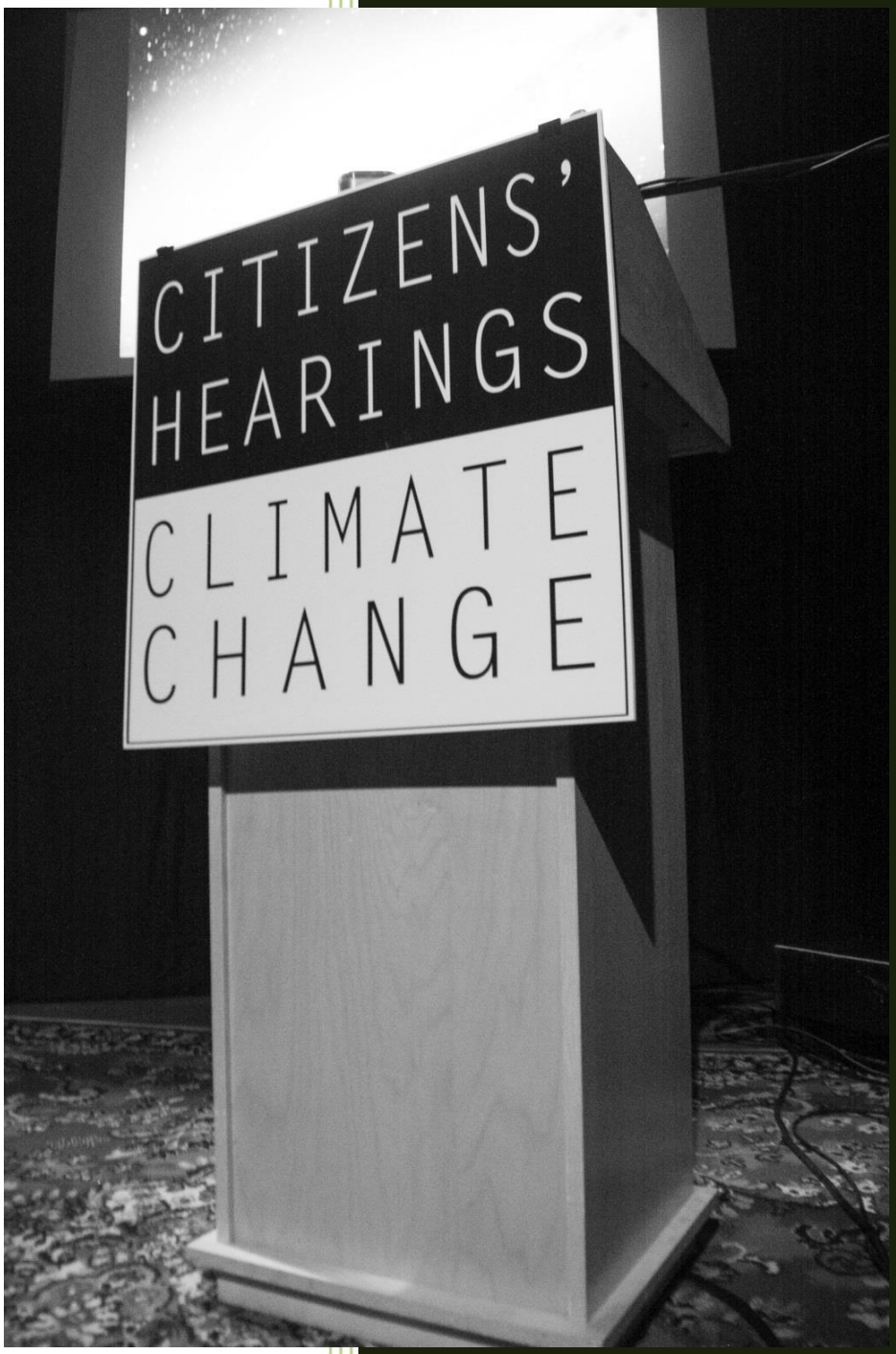
2014

The Saskatchewan Citizens' Hearings on Climate Change



Final Report produced from the Hearings held on November 1st and 2nd, 2013 in Saskatoon.

Commissioners:

Maria Campbell is a writer, playwright, teacher, volunteer, and activist. She is the author of the literary classic *Halfbreed*. Her book *Stories of The Road Allowance People* translates oral stories into print. Her play, *Flight*, was the first all-Aboriginal theatre production in Canada. She went on to write and direct other plays, co-found a film and video production company, produce and direct documentaries, and produce the weekly television series "My Partners, My People." Maria Campbell has received numerous awards, including the National Aboriginal Achievement Award, the Gabriel Dumont Order of Merit, the Chalmers Award for best new play, and a national Dora Mavore Award for playwriting. She was made an Officer of the Order of Canada in 2008. Professor Campbell is currently the Trudeau Foundation Visiting Fellow at the University of Ottawa. Prior to this, she worked with The Centre for World Indigenous Knowledge and Research at Athabasca University. And for several years she taught native studies, creative writing, and drama at the University of Saskatchewan. She has worked as a volunteer with women and children in crisis for over forty years and is co-founder of a halfway house for women in Edmonton as well as an emergency crisis centre for women and children in that city.

Harry Lafond is the Executive Director of the Office of the Treaty Commissioner. He has a wide range of experience in the community, in politics, and in academics, which he brings to the OTC. He has been Chairperson for the Board of Trustees First Nations Trust since 2003. Previously, he served his Nation as Chief (1990-2000). Harry has worked extensively in the area of education including as the Director of Education, and earlier as principal of the kihiw waciston School at Muskeg Lake Cree Nation. Harry was appointed (1994-2000) as the Saskatchewan representative to the Chiefs' Council on Education (Assembly of First Nations). He was appointed to serve on the Board of Governors for the University of Saskatchewan (1995-2002), and was also appointed to the national Federal Task Force on Education (2003). Harry's academic education includes three degrees: B.A., B.Ed. and an M.Ed.

Marcia McKenzie is an Associate Professor in the Department of Educational Foundations at the University of Saskatchewan. She is also Director of the Sustainability Education Research Institute (SERI) (www.seri.usask.ca). She is principal investigator on two SSHRC-funded projects: the Sustainability and Education Policy Network (www.sepn.ca) and the Digital Media Project: Youth Making Place. Her interdisciplinary research focuses on the intersections among environment and sustainability, educational policy and practice, youth identity and place, and the politics of social science research. Dr. McKenzie has published numerous papers and book chapters and is co-editor of *Fields of Green: Restorying Culture, Environment, and Education*. She sits on the editorial boards of a number of journals including *Environmental Education Research*, the *Canadian Journal of Environmental Education*, and the *Canadian Journal of Education*. She is Past Chair of the Environmental Education Special Interest Group of the American Educational Research Association. Jointly appointed to the School of Environment and Sustainability from 2008-2012, Dr. McKenzie has supervised 18 PhD and Master's students, including 2 winners of the Social Sciences Graduate Thesis Award.

Willard Metzger is the Executive Director of Mennonite Church Canada. He was ordained and worked as a pastor for 18 years before transitioning to the position of Director of Church Relations for World Vision Canada. He was the chair of the Mennonite Church of Canada's Witness Council for 10 years, and a member of the steering committee that oversaw realignment of church bodies and the creation of the new structure, Mennonite Church Canada (MC) in 2000. He has extensive experience speaking in Canadian churches across a wide diversity of Christian expression. Willard Metzger received his Bachelor of Theology degree from Emmanuel Bible College in Kitchener, Ont., a Bachelor of Arts degree in Sociology at the University of Waterloo, Ont., and a Master of Theological Studies at Conrad Grebel University College, also in Waterloo. He also has a Doctor of Ministry degree from Ashland Theological Seminary in Ashland, OH.

Supporting Organizations:

Climate Justice Saskatoon	(climatejusticesaskatoon.wordpress.com)
National Farmers Union	(nfu.ca)
Saskatchewan Eco-Network	(econet.ca)
Saskatchewan Environmental Society	(environmentalsociety.ca)
Green Energy Project Saskatchewan	(greenenergysask.ca)

Organizing Committee:

Davida Bentham	Julie Maxwell	Darrin Qualman, Chair
Mark-Bigland Pritchard	Rick Morrell	Karen Rooney
Matt Dow	Janelle Pewapsconias	Rasheed Soomro
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Darrin Qualman assisted in the reviewing of the report.
Jonathan Stockdale assisted with recording testimony.
Karen Rooney coordinated follow-up with presenters.
The Commissioners generously provided general direction for this portion of the report.
The Organizing Committee assisted with editorial review of this portion of the report.
Megan Van Buskirk led formatting, web design and publication of the report.

All persons listed served in a volunteer capacity in the organization of these hearings and the preparation of this report.

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Electronic version of this report is available at: www.skclimatehearings.org

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Introduction

On November 1st and 2nd of 2013, citizens, activists, experts, and decision-makers came together in Saskatoon to learn and talk about climate change—the threats it poses and the urgent actions required if we are to escape its most damaging effects. This is a special report on the proceedings of those two days, and on the observations of the Commissioners who generously listened with care to the testimony.

Over the course of 20 hours, 36 experts, activists, educators, and concerned citizens made oral presentations. Written submissions were also received. Approximately 200 people attended the free event, listened, asked questions, and discussed what they saw and heard. The Hearings made use of internet-based audio-visual technology to allow presentations from remote locations, saving carbon emissions and expanding the circle of those who could present and participate. This also allowed participants at selected off-site locations to view the event and to ask questions.

In every phase and at every level, the Citizens' Hearings embraced diversity and inclusion, with First Nations and Métis citizens well represented in all aspects of planning and conducting these Hearings. A top priority for organizers was that the Hearings include a broad range of presenters—not just experts and scientists, but farmers, grandmothers, homebuilders, healthcare professionals, workers, teachers, and school children.

Four Commissioners presided over the Hearings:
- Maria Campbell, teacher, activist, and author of the literary classic *Halfbreed*;
- Marcia McKenzie, University of Saskatchewan education professor and Director of the Sustainability Education Research Institute (SERI);
- Harry Lafond, Executive Director of the Office of the Treaty Commissioner; and
- Willard Metzger, Executive Director of the Mennonite Church of Canada.

In the first quarter of 2014 the Commissioners worked with Peter Prebble, Director of Environmental Policy for the Saskatchewan Environmental Society and others on the Organizing Committee to produce and publicize this report, with a focus on climate change in Canada's prairies, and on the actions needed at every level in order to avoid the most damaging impacts of climate change.

The Hearings were the culmination of nearly a year's work by an Organizing Committee of 13 people supported by four organizations (Climate Justice Saskatoon, Saskatchewan Eco-Network, National Farmers Union, and Green Energy Project Saskatoon). The Saskatchewan Environmental Society joined with the other four organizations after the hearings to play the lead role in summarizing the testimony given at the hearings. Organizers included Davida Bentham, Mark Bigland-Pritchard, Matt Dow, Sarina Gersher, Bonnie Lawrence, Julie Maxwell, Rick Morrell, Janelle Pewapsconias, Peter Prebble, Darrin Qualman, Karen Rooney, Rasheed Soomro and Megan Van Buskirk. Jonathan Stockdale kindly assisted in the process of gathering a written record of the proceedings.

The Hearings were also made possible by generous contributions from 12 sponsoring organizations: Retail Wholesale and Department Store Union, Regina Public Interest Research Group, The Better Good, Affinity Credit Union, the Saskatchewan Environmental Society, the Saskatchewan Federation of Labour, the Saskatchewan Union of Nurses, Central Business Equipment Systems, the Confederation Inn in Saskatoon, Eat Healthy Foods in Regina, Horizon Distributors, and Pro Organics.

It is the collective effort of the Commissioners, organizers, supporting organizations, sponsors and presenters that made the publication of this report possible.

Conclusions and Recommendations of the Commissioners

Putting it into context

1. The problems of climate change are primarily caused by the greenhouse gas emissions associated with fossil fuel consumption here and around the world. Coal and then oil are the worst greenhouse gas emitters, but there are also substantial emissions associated with burning natural gas. In addition, there are secondary but important sources of human-produced greenhouse gas emissions, and these are particularly relevant in a Saskatchewan context. Examples include: methane and carbon dioxide emissions from fossil fuel extraction, carbon dioxide emissions from deforestation (including the burning of bush and shelterbelts), nitrous oxide emissions from the application of nitrogen fertilizer, and methane emissions from landfills and intensive livestock operations.

2. It is very clear that climate change resulting from human-produced greenhouse gas emissions poses grave risks to the well-being of peoples around the world, as well as to other species. These risks include: severe heat waves, severe flooding in many regions, disruption of the hydrological cycle, unstoppable sea level rise, declines in food production in many regions, serious water shortages in many regions, spread of disease, intensification of wild fires, widespread loss of coral reefs, degradation of ecosystems, extinction of many species, more powerful hurricanes/typhoons, and acidification of the oceans. Portions of our planet are at risk of becoming uninhabitable. The World Health Organization estimates that 150,000 people already die from climate change each year, and if human-produced greenhouse gas emissions are not phased out, this number is certain to rise sharply in the decades ahead. Moreover, there is likely to be large scale migration involving tens of millions of people, as some parts of the world become more and more difficult to live in. Several of the above-mentioned risks are already in the early stages of becoming reality.

3. The dilemma we have gotten ourselves into as a global society is that, once emitted, carbon dioxide and nitrous oxide last an exceptionally long time in our atmosphere – 100 years (average) and 114 years respectively. This is why human-produced emissions have built up to dangerous levels more quickly than many citizens expected. As a result, catastrophic effects from their growing atmospheric concentration can only be avoided by completely phasing out human-produced emissions of these greenhouse gases. In other words, fossil fuel use must be phased out worldwide and replaced with clean renewable energy sources.

4. For our population size, Saskatchewan and Alberta are the worst greenhouse gas polluters in Canada and among the very worst in the world. With only 3% of Canada's population, Saskatchewan accounts for 10% of Canada's greenhouse gas emissions.

5. Climate change is a moral issue that requires a moral response. Without concrete action, critical life support systems will suffer irreparable damage. In our judgment, damaging the planet for the sake of cheap fossil fuel energy is wrong.

6. The negative impacts of climate change are not equally experienced, but are disproportionately felt by those in developing countries, as well as more locally, by Indigenous communities. Those living in poverty, the elderly, and the ill are more likely to be affected by climate change and associated health impacts. Put another way, climate change is a violation of basic justice. The countries most responsible for producing greenhouse gas pollution (like Canada) are for the most part not the countries expected to suffer the gravest consequences of climate change.

7. To date, when it comes to climate change and fossil fuel policy, governments in Saskatchewan, Canada and many other parts of the world appear to be prioritizing short term economic gain over social and environmental health. Given the emerging climate crisis, this is a dangerous strategy.

Saskatchewan: Impacts and Responsibilities

8. With respect to climate change impacts locally, Saskatchewan residents should be particularly worried about the disruption of the hydrological cycle that is now occurring. There has already been a marked increase in flooding in our province over the past decade, and that is likely to continue for some time. Saskatchewan also needs to be concerned about the growing potential for more intense and prolonged drought, a risk likely to become a reality as the century progresses. Third, Saskatchewan is vulnerable to the potential for more extreme weather events.

9. Saskatchewan and all parts of the globe have a moral responsibility to communities most affected by climate change; and to our children, grandchildren, and all future generations to act quickly to reduce greenhouse gas pollution. We also have a special responsibility to other species to protect them from climate change**.** If stabilization of greenhouse gas concentrations in the atmosphere cannot be achieved soon, the economic, social and environmental costs for the next generation will be very high.

Government Leadership and Support

10. Climate change cannot be addressed without the full cooperation and leadership of local, provincial, First Nations, Métis, and national governments. Citizens urgently need their elected representatives at each level of government to work together to establish good climate policy that achieves atmospheric stabilization of greenhouse gases and protects the future of human society and of the other species we share the Earth with. Equally important, the citizens of Saskatchewan need to give their support to the enactment of sound climate policies. That will inevitably involve some inconvenience, but many exciting new opportunities as well.

11. Saskatchewan's government has made no headway over the past decade in reducing total province-wide greenhouse gas emissions. There is no justification for such inaction, given the urgency of climate change and the fact that the Province has many policy levers at its disposal.

Similarly, although worthwhile emission reduction projects are being undertaken at a municipal government level, there is no evidence to suggest that any progress has been made in actually reducing total city-wide greenhouse gas emissions in Saskatoon. The same can likely be said for other large centres across Saskatchewan.

12. Despite the overwhelming scientific evidence that greenhouse gas emission reduction is imperative, national leadership on climate change has been noticeably absent, and is best symbolized by the Government of Canada's withdrawal from the Kyoto Protocol. Kyoto continues to be the only formal climate change treaty among industrialized countries with firm emission reduction obligations, and Canada's withdrawal came despite the fact that the treaty is having a positive effect.

Positive Steps Forward

13. The Citizens' Hearings decided to give special attention to how climate change is influencing the global hydrological cycle, given that these changes appear to be having a major influence in Saskatchewan, Alberta and Manitoba. We were fortunate to have Bob Sanford address this topic. Bob is the Director of the Western Watersheds Research Collaborative and EPCOR Chair of the Canadian Partnership Initiative in support of the United Nations "Water for Life" Decade. He noted that hydrologists have been reporting observed changes in the rate and manner in which water moves through the global hydrological cycle for at least a decade. Concern has grown to the point that in 2013 the World Economic Forum ranked the global hydro-climatic crisis 4th out of 50 top global risks of concern, and 2nd in terms of its potential to impact not just the performance, but the survival, of businesses in many sectors of the global economy.

14. At the local level there are exciting opportunities that municipal governments should pursue to promote energy conservation in buildings, reduce the use of fossil fuels in transportation, and encourage nature to thrive in our communities. This involves a broad range of policy measures such as facilitating the installation of high efficiency lighting, providing alternative energy options for residences and businesses, promoting vehicle sharing and carpooling, and designing a city-wide bicycle path network that provides a real alternative to fossil-fuel based transport. Natural areas – which are important absorbers of carbon dioxide (carbon sinks) should be protected as new subdivisions are planned, and those subdivision plans should include super-energy efficient homes and good solar access for property owners. This report elaborates extensively on the opportunities that exist.

15. At a provincial level there are some obvious places to start cutting emissions that will make a big difference. For example, if the Saskatchewan government required the oil industry in our province to consistently capture and utilize natural gas/methane, instead of venting and flaring it into the atmosphere, millions of tonnes of greenhouse gas emissions would be saved each year. Similarly, if Saskatchewan's aging coal fired power plants were replaced with a broad mix of renewable sources of electricity over the next decade, millions more tonnes of emissions would be saved annually. Those two actions alone would cut Saskatchewan greenhouse gas pollution by approximately one third.

16. Saskatchewan is fortunate to have a remarkable mix of renewable sources of energy that we are only just beginning to utilize. Saskatchewan has the best sunlight resource in Canada, a wonderful wind resource, modest geothermal potential and excellent opportunities for developing biomass. Accelerating the development of these renewable energy resources should be a priority for local, provincial and national governments. So too should promoting energy efficiency in all economic sectors and in all walks of life.

17. The economics of large scale wind power are particularly attractive. There is no reason why Saskatchewan could not integrate far more wind power onto its electricity grid, and encourage the development of wind-farm cooperatives as a way to reduce greenhouse gas emissions and keep profits from wind power circulating in the local community.

18. We note that feed-in-tariffs to accelerate the use of renewable energy technologies such as solar, biomass and geothermal are being used in more than 60 countries worldwide. We encourage the adoption of feed-in-tariffs in Saskatchewan's electricity generation sector.

19. Canada and Saskatchewan should recognize that a world that faces the imperative of phasing out fossil fuels is a world that does not need new large scale fossil fuel extraction assets to be constructed. It is time, for example, for our national government to stop approving the development of new oil sands extraction facilities in Alberta, and for Saskatchewan to drop the idea of developing oil sands in this province. The oil sands sector is currently the fastest growing source of greenhouse gas emissions in our country. It is also time to terminate all subsidies designed to encourage the extraction of fossil fuels, here in Canada and around the world.

20. The Government of Canada should rejoin the Kyoto Protocol, and adopt a national action plan for greenhouse gas emission reduction similar to that of Europe. Most European countries are meeting ambitious greenhouse gas reduction targets, and the European Union is on track to achieve a 20% reduction below 1990 greenhouse gas emission levels by 2020. Canada needs to catch up. The world community is relying on us to do our share.

Concluding Comments

21. Climate change will impact the livelihoods of a great many who rely on the land for their income. This is one of the reasons why greenhouse gas emissions must be curbed quickly. If prompt action is not taken, climate change will lead to loss of habitable land, species loss, increased poverty and climate-related illness and loss of life.

22. In order to fully understand the need to take action on climate change and what to do, we need to remain connected to nature and we must grow in our understanding of how nature sustains us, and how we can best protect it. Simply put, we need to have a relationship with the land. Many witnesses at the hearings addressed the importance of public education in this arena, and the need for a plan to build "sustained awareness" of climate change impacts among all citizens.

23. It is critical that people are fully engaged in the climate change issue. It should become a priority for our school systems, for our Universities and Colleges, and in community education. The future depends on it.

24. We need to build on the wisdom of our Aboriginal ancestors and our living elders at this time of crisis.

25. Enforcement of treaties between the Government of Canada and First Nations may prove to be an important vehicle to secure better protection of the natural environment. An excellent area where this could be tested in court is on First Nations lands that are being negatively impacted by oil sands development. Indigenous communities and social movements have already called the Government of Canada to account for changes to federal legislation, without prior and informed consent of First Nations, which reduce protection of waterways and facilitate further development of oil sands infrastructure.

26. It is important to emphasize that it is the total amount of human-produced greenhouse gas emissions in the atmosphere that will ultimately shape the climate. In other words, every individual, every province and every country's emissions matter. The urgent task of each jurisdiction should be to bring their total greenhouse gas emissions down; failure to do so becomes a burden for everyone else worldwide. Several other parts of the world are successfully reducing greenhouse gas emissions. In Canada the Province of Ontario has provided important leadership in emission reduction by introducing feed in tariffs to promote renewable energy and by phasing out its coal fired power plants.

27. This report contains many excellent examples of personal action that can be taken and of government policies that could be put in place at a local and provincial level to reduce greenhouse gas emissions. We urge readers to examine them closely, and implement them broadly. It is important to remember that we should not wait for national and international action, before we take action ourselves.

Summary of Testimony

1. Stories of Citizens Who are Changing Their Life Path to Help Prevent Climate Change

Profound changes are occurring across the face of our Home planet, Mother Earth – changes that were not readily apparent 25 years ago. These changes are not primarily driven by the natural cycles of the Earth itself. Rather, they are driven by the collective impact of human society, and most particularly by our decision to extract and consume increasingly vast quantities of fossil fuels. The changes are so sweeping that in just the last two decades they have caused the oceans to grow more acidic, Arctic sea ice to melt in vast quantities, and the great mountain glaciers of the Earth to give up much of their ice. They have also caused the great ice sheets of Greenland to melt at an accelerating rate, both from the surface and from their underpinnings in the ocean below. Yet all of this is just the beginning – like rumbling thunder in the distance – unless a more sustainable approach to energy production and economic development is chosen.

The changes described above directly correspond to an ever increasing concentration of greenhouse gases in the atmosphere. Greenhouse gases are heat trapping gases that exist naturally, but that are also released from manmade activities, particularly the extraction and burning of fossil fuels. In nature, greenhouse gas concentrations are miraculously at levels well suited to supporting life on Earth. However, current rates of fossil fuel extraction and consumption are driving up the atmospheric concentration of these gases every year – without exception.

The changes in the atmospheric concentration of greenhouse gases are closely monitored by the scientific community, but to date have been watched with only passing interest by most Saskatchewan residents. Yet there are some among us who have recognized the far reaching implications of what is occurring, and have changed their life path accordingly.

For example, the Citizen Hearings heard from Shane Wolffe who, recognizing what is occurring, gave up his job at the Saskatchewan Government Insurance head office in Regina, and decided instead to spend his time promoting cost effective ways of reducing fossil fuel use. He has focused his efforts on helping homeowners save money and energy through carefully planned home retrofits, and has written a practical book on the subject entitled Future Proof My Building. (Refer to FutureProofMyBuilding.com)

James Glennie of Saskatoon has worked in the energy sector for 23 years. The first 10 of those were spent in the oil and gas industry, but James concluded that the future was not in fossil fuels, but rather in renewable energy, which has a far lower greenhouse gas footprint. He switched careers and focused his efforts on developing wind energy, first in the United Kingdom as Head of Offshore Wind at the British Wind Energy Association, and then in New Zealand as Chief Executive of the New Zealand Wind Energy Association. He has recently moved to Saskatchewan where he is actively building support for community owned wind power.

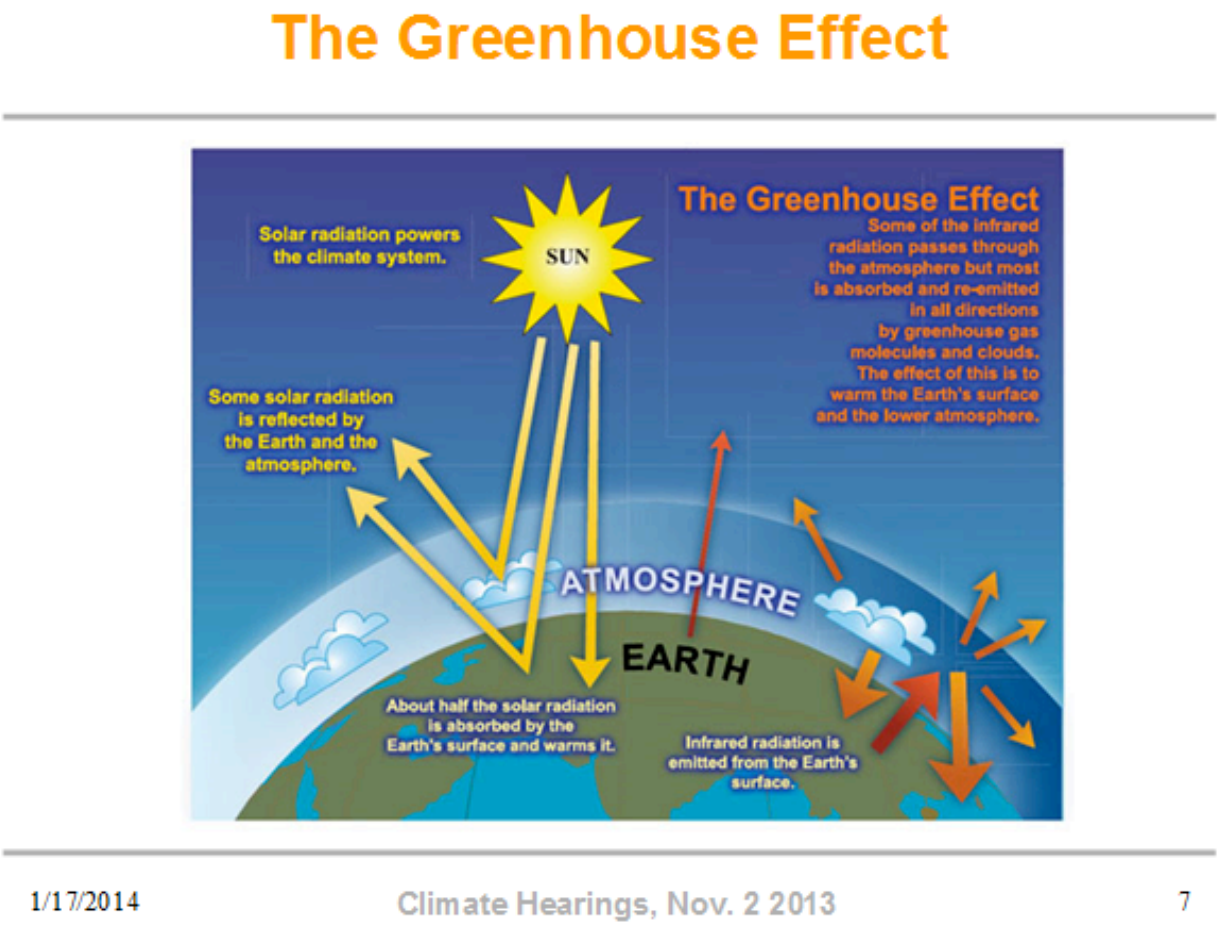
Jan Norris, of Saskatoon, has also realized that current rates of burning gasoline and other fossil fuels is putting the world on a dangerous track. Saddened by what she sees happening to the natural world, Jan resolved to dramatically reduce her own greenhouse gas footprint. She did this by cutting back her travel by automobile and airplane. In fact, **from September 1, 2011 to September 1, 2012, she set an example by not using her car at all for an entire year, and never once boarding a plane.** She walked a great deal, and also used public transit.

It was not an easy experiment. Grocery shopping was more challenging. She often walked for up to an hour to get to work. She particularly missed not getting out of the city during the summer, and not going on her usual northern camping trip. On the other hand, there were important benefits. For every litre of gasoline she avoided burning, she prevented the release of 5 pounds of carbon dioxide to the atmosphere. Walking was an excellent source of exercise, and she got to know many people on her walks, helping to build a greater sense of community.

Clearly, the changes occurring around us are worrying some of Saskatchewan's citizens so deeply that they are willing to make sacrifices and career changes to try to prevent further damage from happening. With this in mind, the Hearings and the Commissioners explored more deeply what is occurring on our planet and in our own prairie environment.

2. Global Observations of Climate Change Impacts to Date

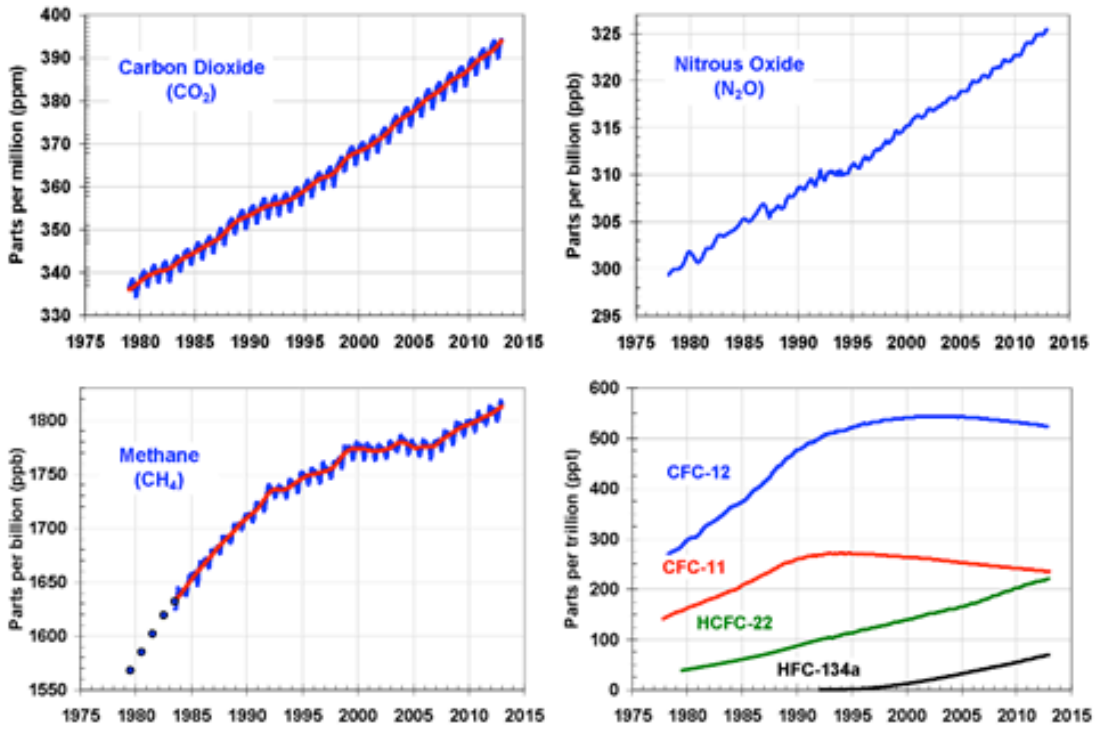
Kirsten Zickfeld is a prominent climate scientist in the Geography Department at Simon Fraser University in British Columbia. She explained in her testimony before the Citizens' Hearings that greenhouse gases in our atmosphere are selective absorbers. They let incoming light pass through Earth's atmosphere, but they absorb radiant heat energy being reflected back from Earth, preventing some of it from leaving our atmosphere. They therefore play a crucial role in warming our planet's surface temperatures, making them suitable for a great diversity of life on Earth.



SLIDE PRESENTED AT THE HEARINGS BY DR. KIRSTEN ZICKFELD

However, **the recent addition of large amounts of manmade greenhouse gases to the natural greenhouse gases already present in the atmosphere is creating an imbalance in the Earth's climate system**. Atmospheric carbon dioxide levels, for instance, have risen from 280 parts per million (ppm) in 1750 to 325ppm in 1970 and then to 396ppm by 2013, largely because of fossil fuel burning and deforestation. Clearly, most of the increase has occurred over the past 40 years. The levels of other crucial greenhouse gases like methane and nitrous oxide have also gone up significantly. The Intergovernmental Panel on Climate Change reports that **greenhouse gas concentrations are now higher than they have been at any time over the past 800,000 years**. The inevitable result is that the average global surface temperature of the Earth is rising.

Carbon dioxide, nitrous oxide and methane continued to rise in 2013 due to manmade emissions.

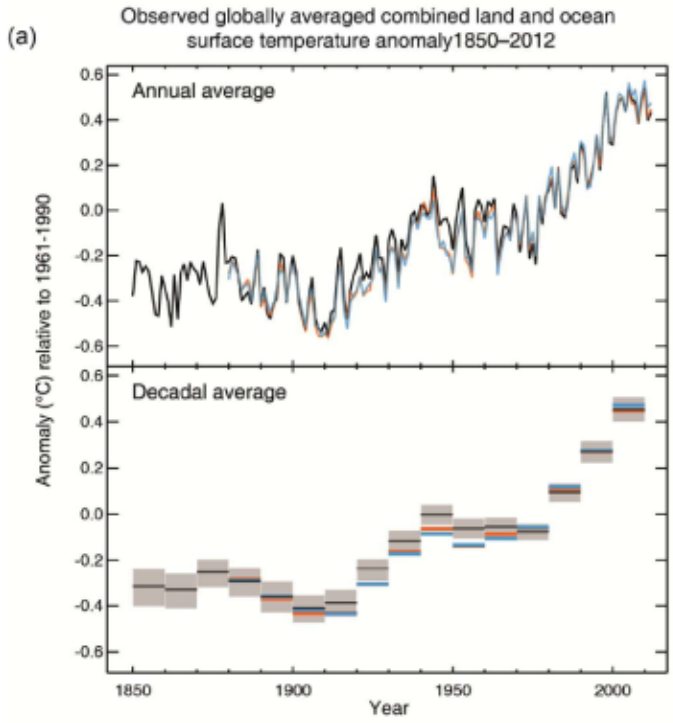


Source: Global Average Abundance of Long Lived Greenhouse Gases Figure 2, The NOAA Annual Greenhouse Gas Index 2013, National Oceanic and Atmospheric Administration Earth System Laboratory, Summer of 2013.

SLIDE PRESENTED AT THE HEARINGS BY PETER PREBBLE

Kirsten Zickfeld stressed that there are natural fluctuations in the Earth's surface temperatures from year to year, and that changes of significance in average global temperature can only be properly assessed over a decade or more. If one compares average global temperature over the period 1850 to 1900 with average global temperature over the period 2003 to 2012, the average surface temperature of the Earth has risen by 0.78 degrees Centigrade. The bulk of that temperature increase has occurred in the last three decades. **The United Nations Intergovernmental Panel on Climate Change (IPCC) has concluded that it is extremely likely (95% confidence) that human influence has been the dominant cause of the observed warming since the mid-20th century.**

Observed Changes in Temperature



- Global mean temperature increased by 0.78° C from 1850-1900 to 2003-2012
- Each of the last three decades has been successively warmer than any preceding decade since 1850

IPCC (2013)

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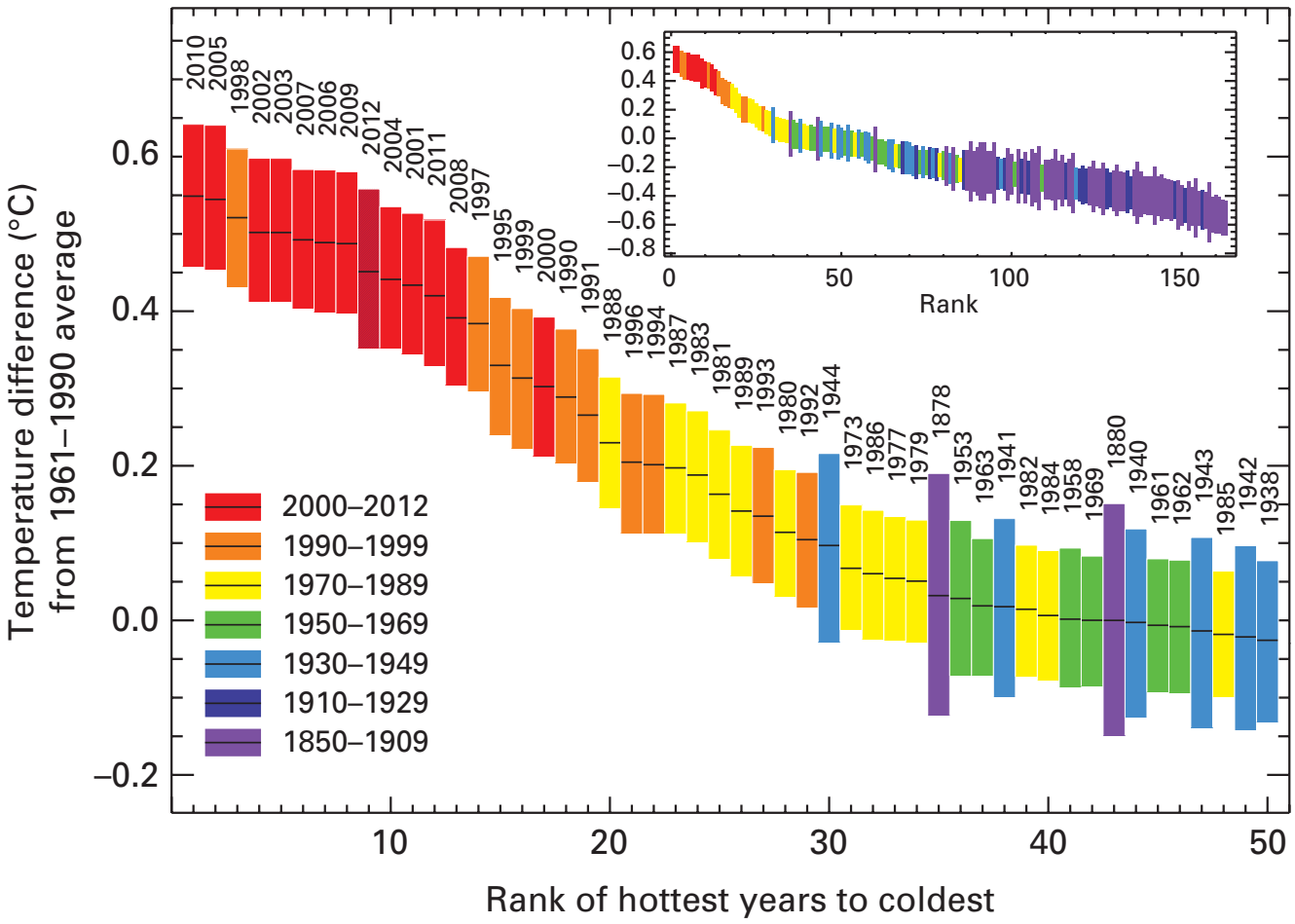
SLIDE PRESENTED AT THE HEARINGS BY DR. KIRSTEN ZICKFELD

Elaine Wheaton, Adjunct Professor at the University of Saskatchewan provided additional clarity on the significance of the warming trend at a global level by pointing out that despite natural variation, global average temperatures have been consistently above the 20th century average temperature for every one of the past 27 years.

A similar perspective was provided by David Sauchyn, head of the Prairie Adaptation Research Collaborative at the University of Regina. Sauchyn noted that **July 2013 was the 341st consecutive month with a global temperature above the 20th century average.**



SLIDE PRESENTED AT THE HEARINGS BY DR. ELAINE WHEATON

The increase in average global temperature has not been uniform across the globe. The warming influence has been more significant in high northern latitudes. This helps explain why Arctic summer sea ice cover is shrinking and why Greenland is melting. Kirsten Zickfeld noted that, in general, **the cryosphere is responding very sensitively to the warming that has already occurred**.

Peter Prebble, Director of Environmental Policy with the Saskatchewan Environmental Society, provided the Hearings with more information about the scale of this response. Citing the latest data published by IPCC he noted that the Greenland ice sheet lost an average of approximately 215 billion tonnes of ice each year between 2002 and 2011, while the world's mountain glaciers lost approximately 275 billion tonnes of ice annually between 1993 and 2009. Meanwhile, the Antarctic ice sheet is estimated to be losing 147 billion tonnes of ice per year. As this ice melts, enormous volumes of water enter the world's oceans, causing a world-wide increase in sea levels.

Melting of ice sheets and mountain glaciers is not the only cause of sea level rise. A second important cause is thermal expansion. As oceans waters become warmer, the molecules of seawater expand slightly, and this also pushes up sea levels.

The combined effect of these forces is an acceleration in the pace at which our oceans are rising. IPCC (2013) reports that the average annual rate of sea level rise between 1901 and 2010 was 1.7 millimetres. However, **from 1993 to 2010, global sea level rise averaged 3.2 millimetres per year**. That trend has worrisome consequences for many coastal communities and island nations in the decades ahead, giving them less time to adapt, and making them increasingly vulnerable to storm surges, salt water intrusion, and loss of some inhabited coastal areas completely.

Peter Prebble drew attention to the increase in extreme weather being experienced around the globe as a result of climate change. For example, as the atmosphere warms, it has an increased capacity to hold more water vapour, and that has led to heavier precipitation events and more serious flooding. United Nations data indicates the number of climate related disasters caused by flooding has tripled since 1980. A second example of extreme weather is the trend toward more hot weather extremes, which in turn increases the risk of drought and forest fires. In 2010, for instance, 18 countries broke national records for their hottest day to date. More recently, **in 2012 the United States faced its warmest year in 118 years of record keeping. That brought with it extended drought that covered more than half the nation. In 2013 Australia set a new continent-wide temperature high, and experienced its hottest summer on record.** Amidst intense heat and widespread bush fires, some Australian states were forced to institute a new category to warn the public of fire risk that goes beyond extreme: 'catastrophic'.

Michael Swandt provided the Hearings with important information on the health impacts of climate change. He drew attention to **World Health Organization estimates that climate change now causes over 150,000 additional deaths each year worldwide**. A very wide variety of other negative health impacts result from climate change. Prominent among them are temperature-related effects such as fainting, heat stroke and worsening of existing heart and lung disease. Elevated temperatures can also bring with them changes to air quality, including the increased conversion of nitrogen oxides to ground-level ozone. This leads to inflammation of airways, exacerbation of asthma, and chronic obstructive pulmonary disease. Also of concern as temperatures rise is the spread of infectious diseases such as West Nile Virus, Lyme disease and malaria. These infectious diseases increase and spread because climate change causes longer transmission seasons, and alters the geographical and seasonal distribution of the relevant carrier insects.

Michael Swandt emphasized that people are also experiencing health impacts because climate change increases the intensity of extreme events such as hurricanes and flash floods. In these circumstances, health impacts include drowning, lacerations, fractures and head injuries, as well as delayed effects such as waterborne illness and increased mental health stress.

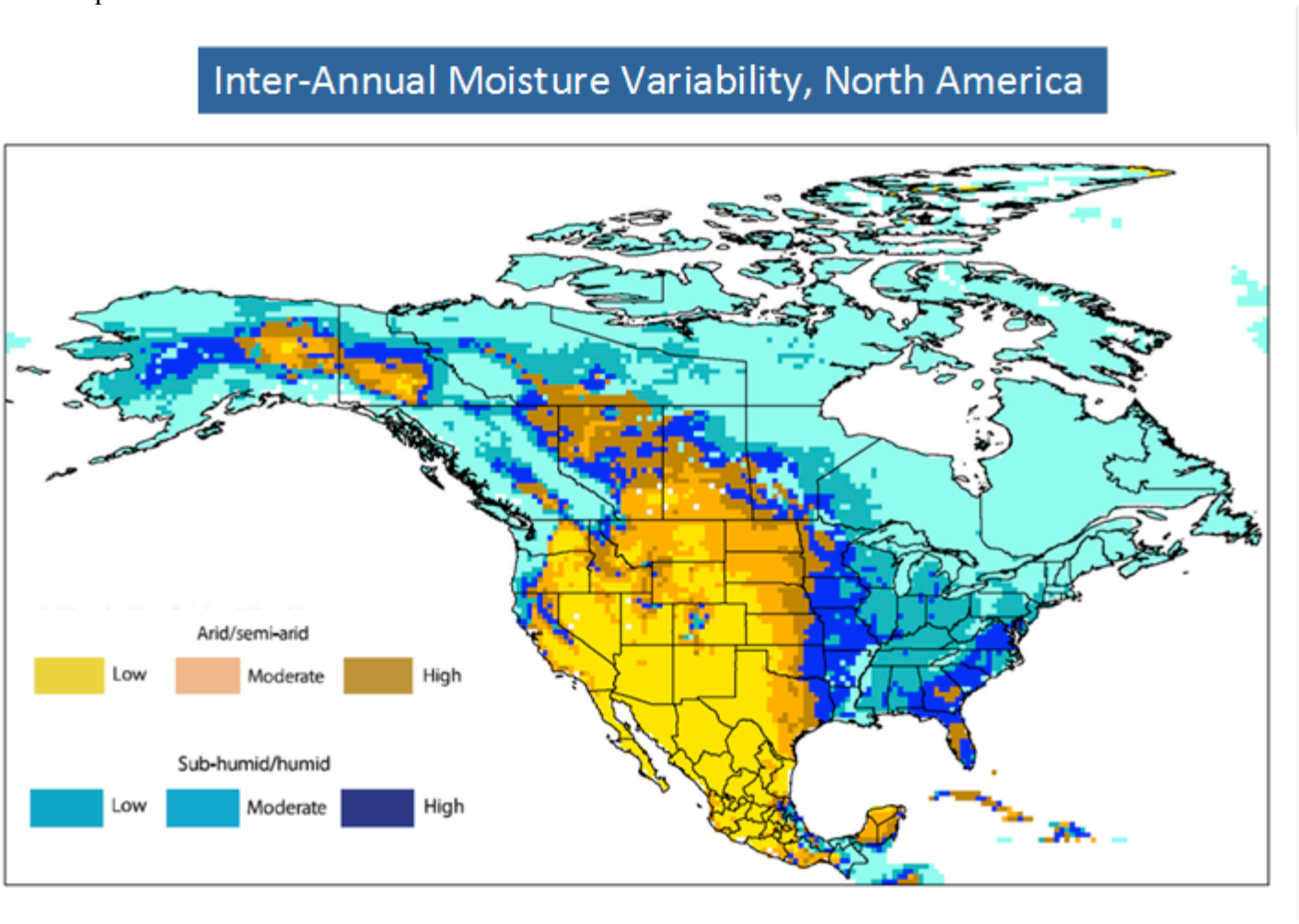
Some of the most significant long term health effects of climate change are likely to stem from its impact on sea levels and on agriculture. In countries like Bangladesh, sea level rise is already causing salination of freshwater aquifers and forcing people to relocate their homes – with serious health consequences. Michael noted that in countries where climate change causes decreased accessibility to nutritious food, due to severe drought or severe flooding, health impacts can range from malnutrition and micronutrient deficiencies to heightened vulnerability among women and children.

Toddi Steelman, Executive Director of the School of Environment and Sustainability at the University of Saskatchewan drew attention to the important issue of social vulnerability from climate change. She emphasized that **the elderly, the young, the infirm and the poor are particularly vulnerable**, as are communities in downstream areas that are subject to impacts such as more intense flood events.

3. Recent Observations and Future Projections of Climate Change Impacts in Saskatchewan

The Saskatchewan Citizens' Hearings on Climate Change were fortunate to receive testimony on the effects of climate change on the Prairies from both a scientific and traditional knowledge perspective.

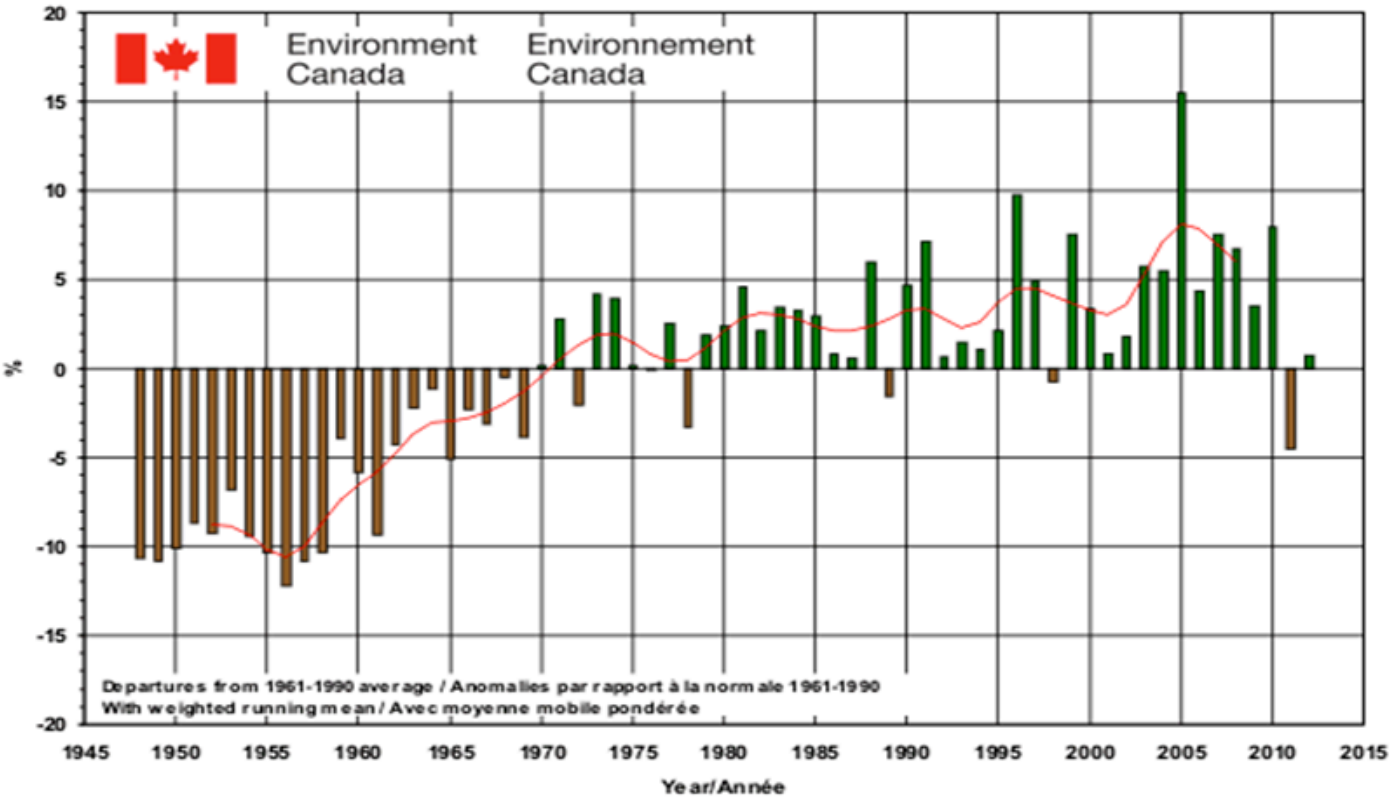
David Sauchyn, head of the Prairie Adaptation Research Collaborative, emphasized Saskatchewan's enormous natural variation in weather conditions. For example, some of the largest variations in rain and snow in the world are in Saskatchewan and Alberta. As a result of this, global trends driven by climate change are often less clearly discerned in our province. He stressed, however, that at a global level the signals being given by climate change are very clear. By the time those signals are equally clear in Saskatchewan, it could be the 2050's or 2060's. This is not a reason, however, for Saskatchewan to delay action on reducing greenhouse gas emissions or on adaptation work.



SLIDE PRESENTED AT THE HEARINGS BY DR. DAVID SAUCHYN

Toddi Steelman, Executive Director of the School of Environment and Sustainability at the University of Saskatchewan provided a national context for our discussion by explaining that **both annual average temperature and annual precipitation have been on the rise in Canada since 1950**. Annual temperatures have warmed by 1.7 degrees Centigrade over the past 65 years, and with the exception of four years, precipitation levels in Canada have been above the 1961-1990 average ever since 1973, and have been rising during that time.

Annual National Precipitation Departures with Weighted Running Mean, 1948 - 2012



SLIDE PRESENTED AT THE HEARINGS BY DR. TODDI STEELMAN

Toddi Steelman noted that the prairies had the highest variability in water yield in Canada between 1971 and 2004. She highlighted the projection of her colleague, Dr. John Pomeroy (Centre for Hydrology) that **we can expect to have increased flooding on the prairies due to climate change between now and 2030, and then more drought on the prairies between 2030 and 2050.** She reminded us of the inter-provincial nature of the Saskatchewan River system, and stressed that any solution to manage flooding and drought will need to involve collaboration across political borders to achieve workable solutions.

Elaine Wheaton, Adjunct Professor at the University of Saskatchewan and Emeritus Researcher at the Saskatchewan Research Council noted that one of the results of the increasing temperatures is that the frost free season in central Saskatchewan has increased by at least 25 days over the past 50 years. The number of hot days – in excess of 35 degrees Centigrade – has also increased in Saskatchewan: from 1 to 3 days in the 1960's to 2 to 5 days in the 2000's.

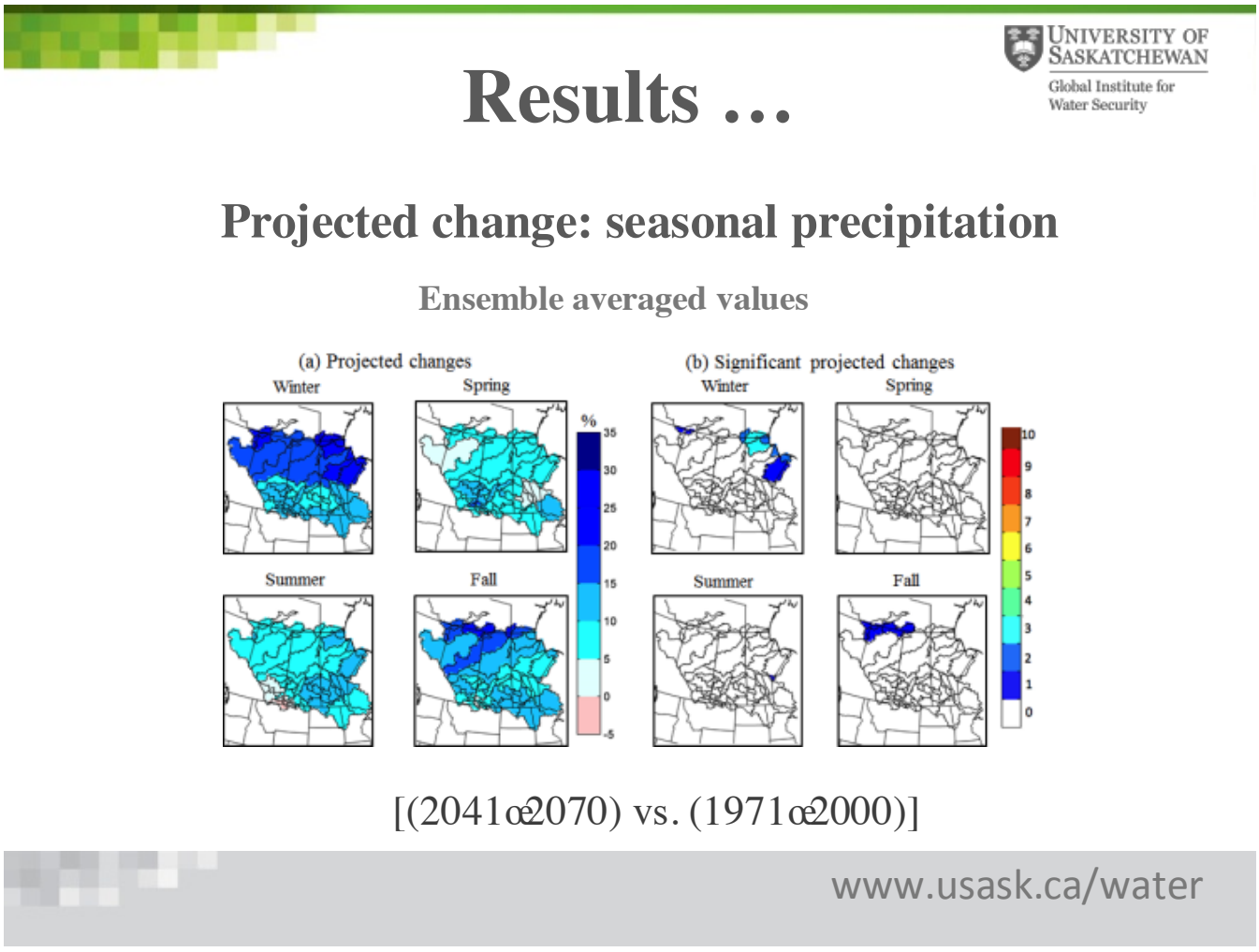
As climate change impacts continue over the course of coming decades, these trends are likely to accelerate. Elaine Wheaton indicated that we can expect more switches of dry/wet and hot/cold, and increased atmospheric capacity for major rainstorms in Saskatchewan with higher intensity, duration and frequency of precipitation. Thus there will be more risk of flooding. Saskatchewan crop yields are likely to increase in the near future with a longer growing season and a higher number of heat units. However, Elaine Wheaton noted that the wild cards

in this scenario are increased drought, intense rainfall, and heat waves, which taken together could remove these yield gains, or worse. Milder winters could also result in increased risk of pests and disease, while higher summertime temperatures are likely to increase water use and result in higher evaporative losses.

Naveed Khaliq of the University of Saskatchewan School of Environment and Sustainability presented evidence on his assessment of future changes to precipitation characteristics over the Canadian prairies provinces using climate models. He sought to predict changes to characteristics of winter, spring, summer and fall precipitation, as well as rain and snow dominated extremes. To do so, he used a multi-Regional Climate Model ensemble available through the North American Regional Climate Change Assessment Program, and did analytical work for 47 watersheds. He worked to compare the 2041-2070 period with the period 1971-2000.

Analysis using the climate model "ensemble-averaged" projected changes showed an increase in mean seasonal precipitation and in rain and snow dominated extremes. He explained that the projections of the models for changes to seasonal precipitation are not outside the range of natural variability. However, the projections for changes to rain and snow dominated extremes do lie outside the range of natural variability.

"For warm and cold season precipitation extremes, mostly increases in the intensity of extremes are noted. Decreases in the intensity of precipitation extremes appear to be a less likely case" he said. Naveed Khaliq emphasized that these changes in seasonal and extreme precipitation characteristics will have important implications for managing regional water security-related issues in Alberta, Saskatchewan and Manitoba.



SLIDE PRESENTED AT THE HEARINGS BY NAVEED KHALIQ

Rose Richardson shared with the Hearings her observations of the changes that are occurring in parts of northwest Saskatchewan based on her intimate knowledge of the land, gained from trapping and harvesting traditional plants. She reported that she is beginning to see more wood ticks in the northern forest. She is also observing fewer song birds, and is noticing fewer frogs and bees.

She noted that extreme weather conditions and dramatic changes in weather patterns have affected traditional medicinal wild plants and the beauty of the environment. Areas that were previously natural forest are gradually becoming tree plantations or sand dunes. **Willows and tree buds, which are used in traditional healing, are being affected by extreme and fluctuating weather patterns, and this is playing havoc on plant regeneration**. For example, over the past 4-5 years, she has noticed that December warm spells have invited willows to start budding, only to freeze and drop their buds when a severe cold snap ensues.

Rose Richardson reported that **extreme storms, never seen before in her area, are affecting ecosystems**. Large forest areas have blown down with increases of plow winds, damaging the nesting and breeding ground of animals, and destroying many plants that rely on an upper canopy to survive. This includes damage to some small plants used in traditional medicine, which need the protection of larger trees for shade. Rose also observed that flooding patterns are changing, and seem to be more intense. The waters are higher, washing away roads and bridges and natural wildlife habitats. Prolonged flooding is changing flood courses and turning dry lands into wetlands, altering plant life patterns. Flooding is also impacting bears, making fishing more difficult because of high waters.

Traci Braaten discussed changes in extreme weather being experienced in First Nations communities. She observed that far northern communities are experiencing more thunder storms, and in southern Saskatchewan several First Nations communities have experienced flooding at levels that require declaration of a state of emergency. Sometimes, communities are facing extreme flood events over multiple years.

Her experience from the Saskatchewan floods of 2010 is that the Government of Saskatchewan needs to get more information from First Nations people on natural processes that are unfolding in their communities. This will assist with preparing an adequate public safety response.

For example, in 2010 ice on rivers was peaking several inches higher than predicted by the Saskatchewan Watershed Authority (now Saskatchewan Water Security Agency). As an example of the difficult extremes being experienced, Traci Braaten pointed to Jumping Deer Creek where temperatures rose 18 degrees Centigrade in one day, so that water covered trees in coulees. The next day blizzard conditions ensued, leaving the local First Nations community fighting flood conditions in a blizzard.

Peter Prebble, Director of Environmental Policy at the Saskatchewan Environmental Society noted that one sign of the growing impact of more extreme weather in Saskatchewan is the rise in spending under the Provincial Disaster Assistance Program (PDAP). Prior to 2005, annual PDAP spending in Saskatchewan was typically under $2,500,000 dollars, depending on the specific nature of the severe weather events that occurred. Following major flooding in eastern Saskatchewan in the summer of 2005, PDAP expenditures jumped to $15,154,000 in fiscal year 2005-06. Expenditures have been escalating significantly ever since. Modest improvements were made to the PDAP program by the Government of Saskatchewan in 2010, but the vast bulk of PDAP expenditure increases have been necessitated by widespread flooding problems in many parts of Saskatchewan.

SASKATCHEWAN'S PROVINCIAL DISASTER ASSISTANCE PROGRAM SPENDING

Fiscal Year Ending March	Total Spending
2002	$1,500,000
2003	$1,675,000
2004	$ 618,000
2005	$ 276,000
2006	$15,154,000
2007	$ 9,866,000
2008	$31,378,000
2009	$14,486,000
2010	$10,440,000
2011	$48,150,000
2012	$157,115,000
2013	$72,597,000

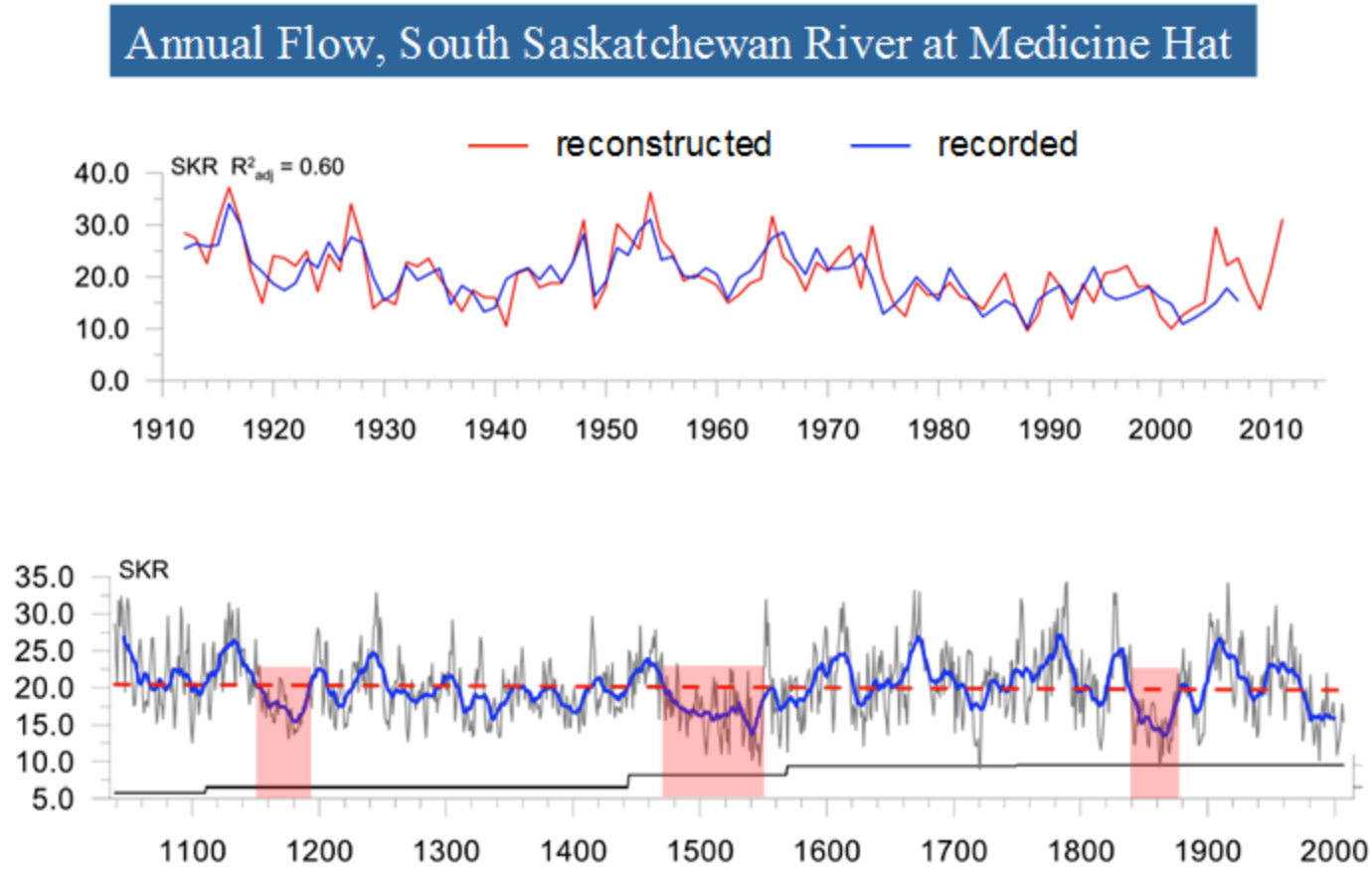
Source: Volume 2 Saskatchewan Government Public Accounts for the fiscal years 2001-2002 through to 2012-13. Slide prepared by Peter Prebble, Director of Environmental Policy, Saskatchewan Environmental Society

SASKATCHEWAN ENVIRONMENTAL SOCIETY

SLIDE PRESENTED AT THE HEARINGS BY PETER PREBBLE

David Sauchyn, head of the Prairie Adaptation Research Collaborative, emphasized that despite increased precipitation and flooding risks currently being experienced, **drought will reoccur, and when it does, there is potential for very severe effects.** Looking back at the last 1,000 years, extended droughts of 20-30 years have occurred on the South Saskatchewan River on several occasions. For instance, in 1850 the river fell and stayed low for 25 years.

David Sauchyn explained that next time such an event occurs, **the difference will be that it will be taking place in a warming climate**, and that has the potential to compound the effects. He therefore emphasized that it is important for us to ask ourselves what we will do in the face of a potential drought of 25 or 30 years later in this century.



SLIDE PRESENTED AT THE HEARINGS BY DR. DAVID SAUCHYN

4. Changes to the Global Hydrological Cycle Driven by Climate Change and the Implications for the Canadian Prairies

The Citizens' Hearings decided to give special attention to how climate change is influencing the global hydrological cycle, given that these changes appear to be having a major influence in Saskatchewan, Alberta and Manitoba. We were fortunate to have Bob Sanford address this topic. Bob is the Director of the Western Watersheds Research Collaborative and EPCOR Chair of the Canadian Partnership Initiative in support of the United Nations "Water for Life" Decade. He noted that hydrologists have been reporting observed changes in the rate and manner in which water moves through the global hydrological cycle for at least a decade. Concern has grown to the point that in 2013 the World Economic Forum ranked the global hydro-climatic crisis 4th out of 50 top global risks of concern, and 2nd in terms of its potential to impact not just the performance, but the survival, of businesses in many sectors of the global economy.

Bob Sanford began by discussing how scientists are increasingly recognizing that polar ice is a thermostat that governs major weather patterns globally. **The concern is that if we lose the refrigerating influence of Arctic sea ice, global temperatures will sky-rocket, with possible releases of methane in the permafrost zone that will further exacerbate warming.**

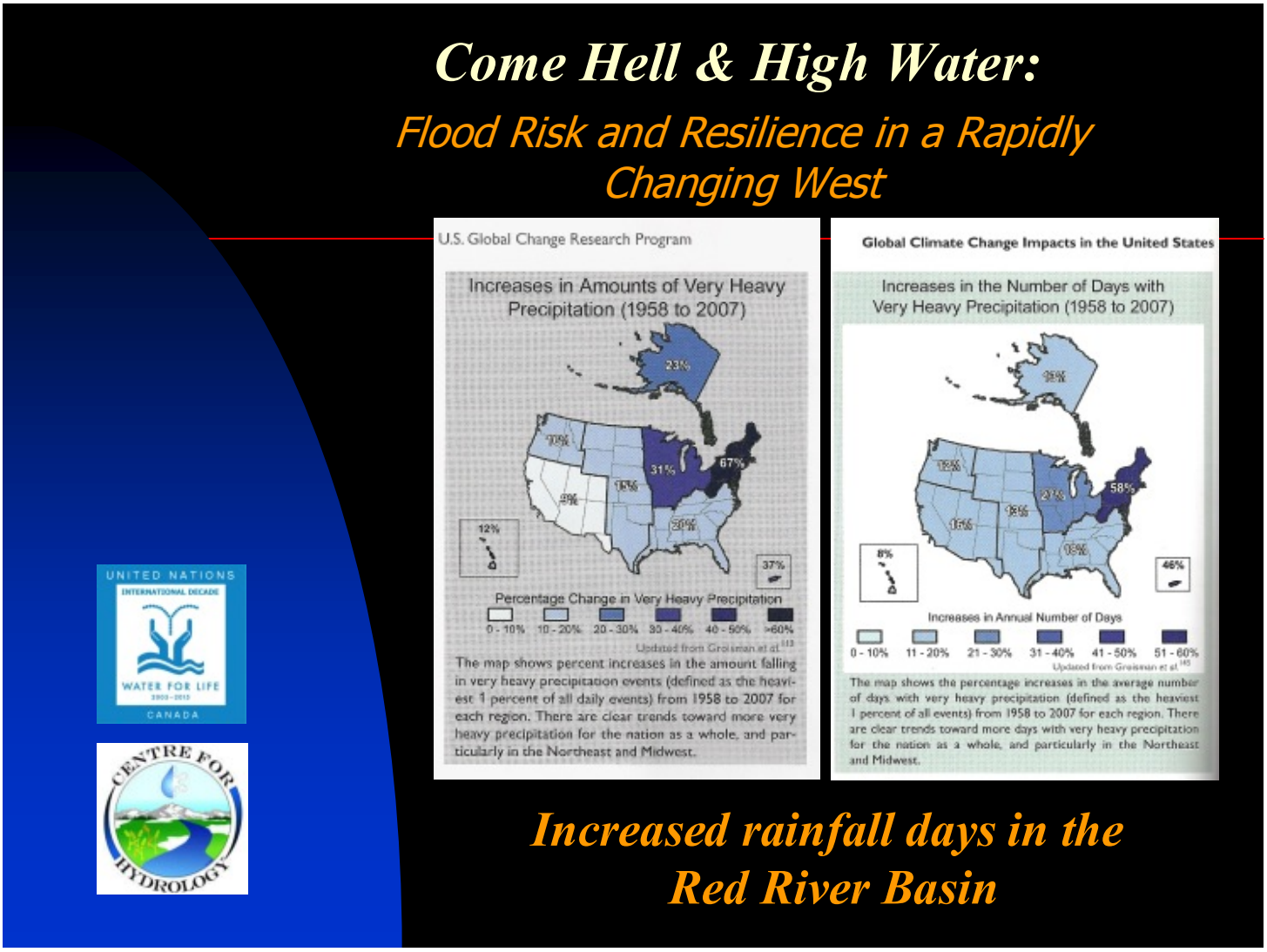
Bob Sanford observed that the loss of Arctic sea ice and the reduction of the extent and duration of snow cover in the Northern Hemisphere are also reducing the temperature gradient between the pole and the tropics. He pointed out that it is this difference in temperature between the polar region and the warmer air to the south that largely defines the behaviour of the Jet Stream. Sanford went on to say:

> "Observations of the Jet Stream have revealed that warmer atmospheric temperatures do not automatically translate into warmer weather. In a uniformly warmer and therefore more turbulent atmosphere, both warm and cold fronts end up and persist in places in the mid-latitudes in which they were not common in the past, often causing floods and droughts of magnitudes we are poorly equipped to manage. What we are seeing in Europe and North America is not so much warming, as the destabilization of historic weather patterns**. People are complaining that the weather is all over the place…What we are now experiencing – more and more widely – are floods, droughts and fires in the same river basins in the same year."**

Bob Sanford argued that atmospheric warming is causing the post-glacial hydrological wealth of Canada to change form. The liquid water is not disappearing; rather it is moving to a different place in the hydrosphere, where it may not be available for our use, but where it can cause a lot of damage.

One of the profound changes taking place is the disappearance of glaciers in the Canadian Rockies, where as many as 300 glaciers disappeared entirely between 1920 and 2005. It appears that trend is now accelerating. A second change is the enormous evaporation from the Great Lakes, where as much as 67 cubic kilometers of water has disappeared from Lake Huron alone. While dredging of the St. Clair River at the mouth of Lake Huron accounts for some of this loss, much of it has simply been lost to the atmosphere, where it becomes available to fuel even more intensive storm events. A third large shift is the changes in precipitation patterns on the Canadian Prairies. Bob Sanford noted that **more prairie rainfall is now being produced by multi-day rainfall events generated by frontal storms, as opposed to shorter term local thunderstorms.** He explained that the changes are negatively affecting water quality, as heavy 'run-off producing' rains wash nutrients, bacteria and toxic contaminants into waterways. He expressed special concern for the future of Lake Winnipeg, which is already plagued by enormous algal blooms, and where increases in the duration and intensity of extreme weather are likely to cause further nutrient loading and contamination.

In a thread similar to the evidence presented about increased precipitation and flooding in parts of Saskatchewan, Bob Sanford noted that precipitation levels have also increased in the Red River Valley, as shown by the slide below.



SLIDE PRESENTED AT THE HEARINGS BY BOB SANFORD

He explained that these **"corridors of intense winds and moist air can be 400-500 kilometres across and thousands of kilometers long. They can carry the equivalent of 7 to 15 times the average daily discharge of the Mississippi River."**

Atmospheric rivers produce flooding of enormous magnitude, and their capacity grows with the ability of a warmer atmosphere to hold more water vapour. Bob cited the 2010 floods that hit Pakistan and Australia as examples. In July and August of 2010 heavy rainfall and flooding left at least six million residents of Pakistan in urgent need of food and clean water, and constituted the biggest humanitarian crisis the country has faced. In December of 2010 flooding hit northeast Australia impacting more than 80 communities with a flood zone that stretched over an area bigger than France and Germany combined.

On the evening of June 20, 2013 Bob Sanford's home town of Canmore, the City of Calgary, and many other communities in southern Alberta experienced a similar type of event. Following very heavy rainfall, Bob recalled:

> "A spectacularly swollen pulse of floodwater flowed downstream from the mountains into the unprepared City of Calgary. **Twenty neighbourhoods had been evacuated, and more than 100,000 people forced from their homes.** But Calgary wasn't the only municipality that was in trouble. Twelve southern Alberta communities had declared states of emergency. Eight communities besides Calgary were under evacuation orders… Flooding was particularly serious in small towns immediately south of Calgary. The flood waters had risen so quickly in High River that residents were trapped in their cars and in their homes, and had to be rescued from their roofs. **The Town of High River was almost completely inundated. Two-thirds of the community flooded and 5000 residents were forced from their homes, including my sister and her husband, who lost everything."**

Soon 1,300 soldiers were sent into flood zones and Premier Alison Redford announced a billion dollars in emergency disaster relief. Bob noted that several lessons can be garnered from Alberta's experience. While the Province of Alberta responded effectively in recovery efforts, the right systems were not in place to predict and manage an event of this magnitude. Moreover, provincial flood maps – based on average flows - were "inaccurate and largely irrelevant". Clearly, the growing threat of extreme weather events means that storm water infrastructure, designed for a more stable climate, needs to be replaced with new systems designed to handle greater extremes. This latter point is reinforced by the US National Academy of Science, which concluded in 2011, that hydrologic stationarity has been lost, and that we can no longer assume that the past will be a guide to the future.

Bob Sanford emphasized **that we have to make disaster resilience a national priority** in Canada, as the United States has done. And he stressed that "when supposed experts tell you that we don't have to worry because the Earth has experienced high carbon dioxide concentrations and warmer temperatures in the past, they don't tell you that during those epochs, extreme weather events lasted for days or even weeks. The problem is not going away." Predicted rises in temperatures of between 2 and 6 degrees Celsius will cause further amplification of the hydrological cycle. Thus, Bob explained that **the flooding in Alberta in 2013 is "nothing compared to what the atmosphere is capable of delivering in the future."**

Alberta was not the only part of the world to experience this kind of flooding in 2013. Central Europe, Colorado and Russia were also hard hit. Bob Sanford described the events that unfolded in Russia as "almost the stuff of science fiction. The weakening of the European Jet Stream caused by reduced snow and sea ice cover led to the creation of a heat dome in Northern Siberia. In July (2013), hundreds of wildfires broke out that were so hot they melted the permafrost below the burning forests creating methane releases from the thawing tundra that added fuel to the fires. Then in early August, in the midst of what was coming to resemble a virtual fire storm, three atmospheric rivers collided over the region, and within four days created a flood that covered a million square kilometers."

Sanford concluded by commenting on the overall threat we face: "Every part of the water cycle flows through, and affects, and is affected by every other part. Changes in the extent and duration of Arctic sea ice and northern snow pack and snow cover have begun to have a cascading effect on weather and climate right down to mid-latitudes. **The loss of hydrologic stationarity is a society game changer**….We now have to be alert to changes in the larger global hydrological cycle, and where possible try to manage and adapt to them…My fear is that the accelerating hydro-climatic effects associated with warming temperatures may have already gotten away on us."

Bob Sanford urged governments and citizens to take action to restore critical aquatic ecosystem function, reverse soil degradation, stop over-applying nutrients that contaminate our rivers and lakes, stop our wastage of water and energy, and stabilize atmospheric temperatures through major reductions in greenhouse gas emissions. These measures would all contribute towards reducing further damage to the global hydrological cycle.

5. Predicted Consequences of Climate Change at the Global Level

The United Nations and its member countries have resolved to prevent global average surface temperatures from rising by more than 2 degrees Centigrade over pre-industrial levels. Increases above this amount are judged to pose unacceptable dangers.

A global average temperature increase of about 0.78 degrees Centigrade above pre-industrial levels has already occurred. While this does not seem large to us here in Saskatchewan, where we experience a wide variation in temperatures over the course of the year, it is in fact, a very significant increase. Peter Prebble likened it to a temperature increase in the human body, where a series of small temperature rises can soon produce a fever.

Moreover, because there is a delayed response to recent increases in atmospheric greenhouse gas concentrations, a further global average temperature increase in the range of 0.2 degrees Celsius over the next 2 decades is almost certain to occur, even if all greenhouse gas emissions were to stop today. (For further detail on this point refer to IPCC 2007, *The Physical Science Basis*, starting at page 12 of the Summary for Policy Makers.) Beyond this, future temperature increases in the lower atmosphere and on the surface of the Earth will be highly dependent on future trends in manmade emissions of greenhouse gases worldwide.

Several speakers at the Citizen Hearings' discussed projections by the Intergovernmental Panel on Climate Change (IPCC) for global average surface temperature, sea ice extent in the Northern Hemisphere, and ocean acidity. Kirsten Zickfeld noted the IPCC projections are based on four different greenhouse gas emission scenarios referred to as Representative Concentration Pathways. These scenarios also take account of aerosols and other climate drivers. Each scenario is identified by its approximate total radiative forcing in 2100, relative to 1750.

Each of these four scenarios results in different future concentrations of greenhouse gases in the atmosphere. Each is also a reflection of different choices in climate change policies and in fossil fuel consumption.

The Difference between CO_2 and CO_2equivalent:
When scientists refer to CO_2 concentrations in the atmosphere, they are referring only to how much carbon dioxide is in the atmosphere. This is expressed in parts per million, and in 2013 averaged 396 parts per million over the course of the year. When scientists refer to CO_2e, they are referring to the combined concentration in the atmosphere of: carbon dioxide, nitrous oxide, methane and other greenhouse gases monitored under the Kyoto Protocol. This number will naturally be higher than CO_2 alone. The other gases are being weighted by their global warming potential relative to CO_2, and are being added to CO_2 levels.

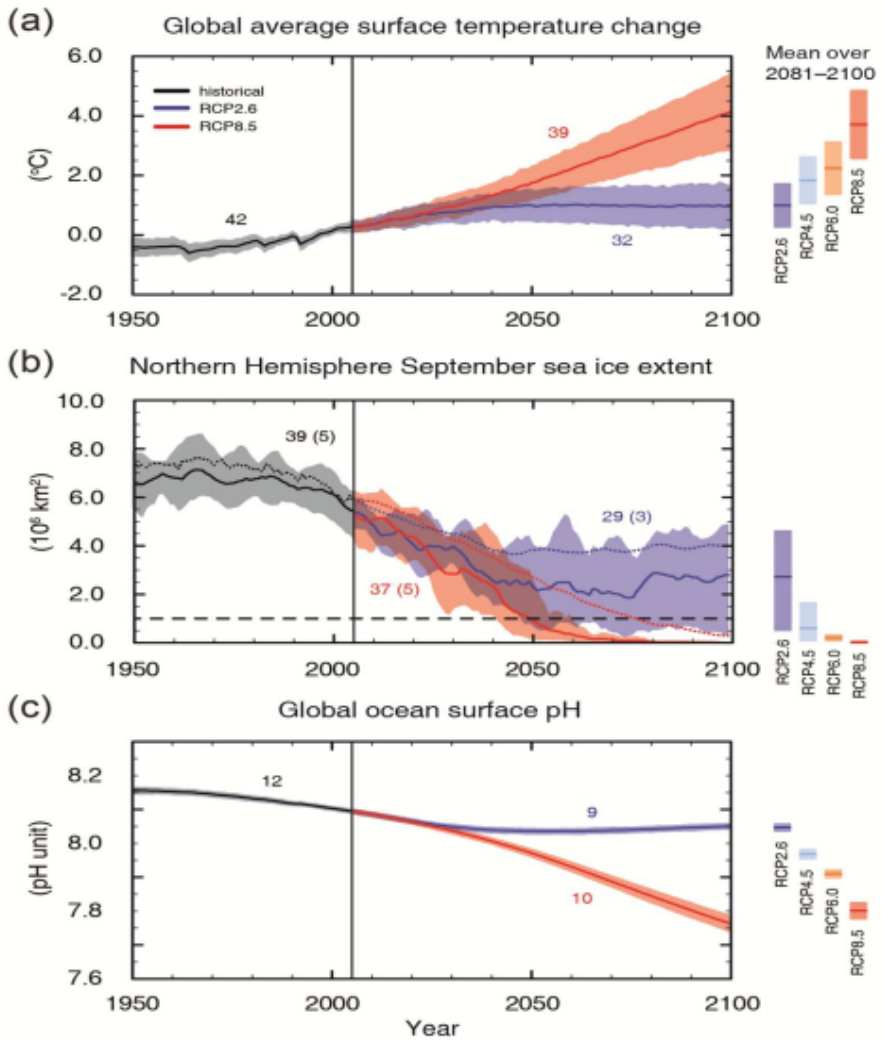
Atmospheric greenhouse gas concentrations currently sit at approximately 435 parts per million CO_2equivalent, a measurement that takes account of carbon dioxide levels, as well as methane and nitrous oxide levels. This concentration has been rising at an average of over 2 parts per million each year.

Projecting into the future, the lowest IPCC Representative Concentration Pathway (RCP

2.6) is based on the assumption that future manmade greenhouse gas emissions decline sharply (i.e.: fossil fuel use declines very rapidly). Radiative forcing therefore also declines. Under this scenario, the rise in greenhouse gas concentration in the atmosphere is limited to 475 parts per million CO_2equivalent by 2100.

The other three greenhouse gas emission scenarios each presume progressively higher levels of fossil fuel use. Under RCP 4.5 greenhouse gas emissions and radiative forcing have stabilized by 2100. Nevertheless, greenhouse gas concentrations in the atmosphere have reached 630 parts per million by 2100. Under scenario RCP 6.0 fossil fuel use has been higher still, and has therefore resulted in greater radiative forcing. Greenhouse gas concentrations in the atmosphere sit at 800 parts per million by 2100. In the fourth and highest fossil fuel use scenario, greenhouse gas concentrations in the atmosphere have reached 1,313 parts per million COe_2quivalent by 2100.

As can be seen from the chart below, **all three of the higher greenhouse gas emission scenarios are likely to result in a global average surface temperature increase of close to or well above 2 degrees Centigrade by the end of the century. This would put global average surface temperatures close to or well above the range judged to be dangerous and unacceptable by the United Nations and its member countries (including Canada).**



GRAPHS FROM THE INTERGOVERNMENTAL PANEL ON CLIMATE CHANGE (2013)
PRESENTED TO THE CITIZENS' HEARINGS BY DR. KIRSTEN ZICKFELD

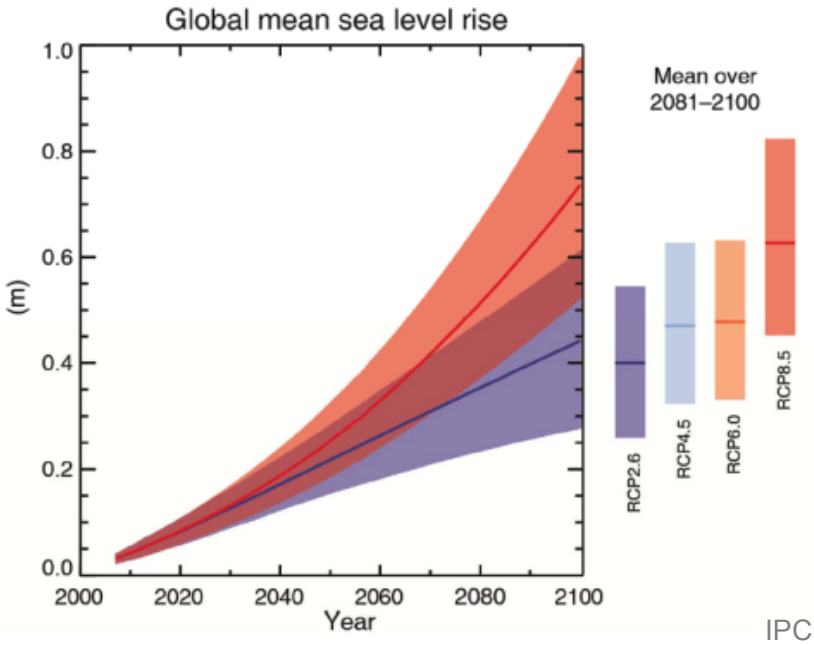
Kirsten Zickfeld explained that the three higher greenhouse gas emission scenarios are also forecast to cause the loss of most or all of the summer sea ice in the Northern Hemisphere by 2100, a profound change for the planet, since far more of the sun's energy would consequently be absorbed by open Arctic waters that will have lost much of their reflective property. That would in turn accelerate further planetary warming.

Similarly, **the three higher greenhouse gas emission scenarios are each predicted to result in a steady decline in ocean surface pH**. In other words, these emission scenarios will trigger increasing acidity of the oceans, with consequent negative effects for coral reefs and many forms of marine life.

Only the fourth and lowest greenhouse gas emission scenario avoids the above mentioned consequences with high confidence. Achieving this emission scenario requires large, rapid and sustained reductions in manmade greenhouse gas emissions. In effect, **worldwide fossil fuel extraction and consumption would need to be phased out nearly entirely by mid-century, and a very rapid reduction in use would be required in the decade ahead.**

Even this low emission scenario cannot stop ongoing sea level rise during this century, but sea level rise is forecast to be more serious under the three higher emission scenarios. Similarly, the low emission scenario cannot stop further temperature rise, but is expected to limit it to a global average increase of 1.7 degree Centigrade above the pre-industrial average. **Importantly, the low emission scenario avoids the dangers of a 2 degree Centigrade, 3 degree Centigrade or 4 degree Centigrade temperature rise**. Very importantly, it also avoids the prospect of ongoing surface temperatures increases in the centuries ahead.

Sea Level Rise in the 21st Century

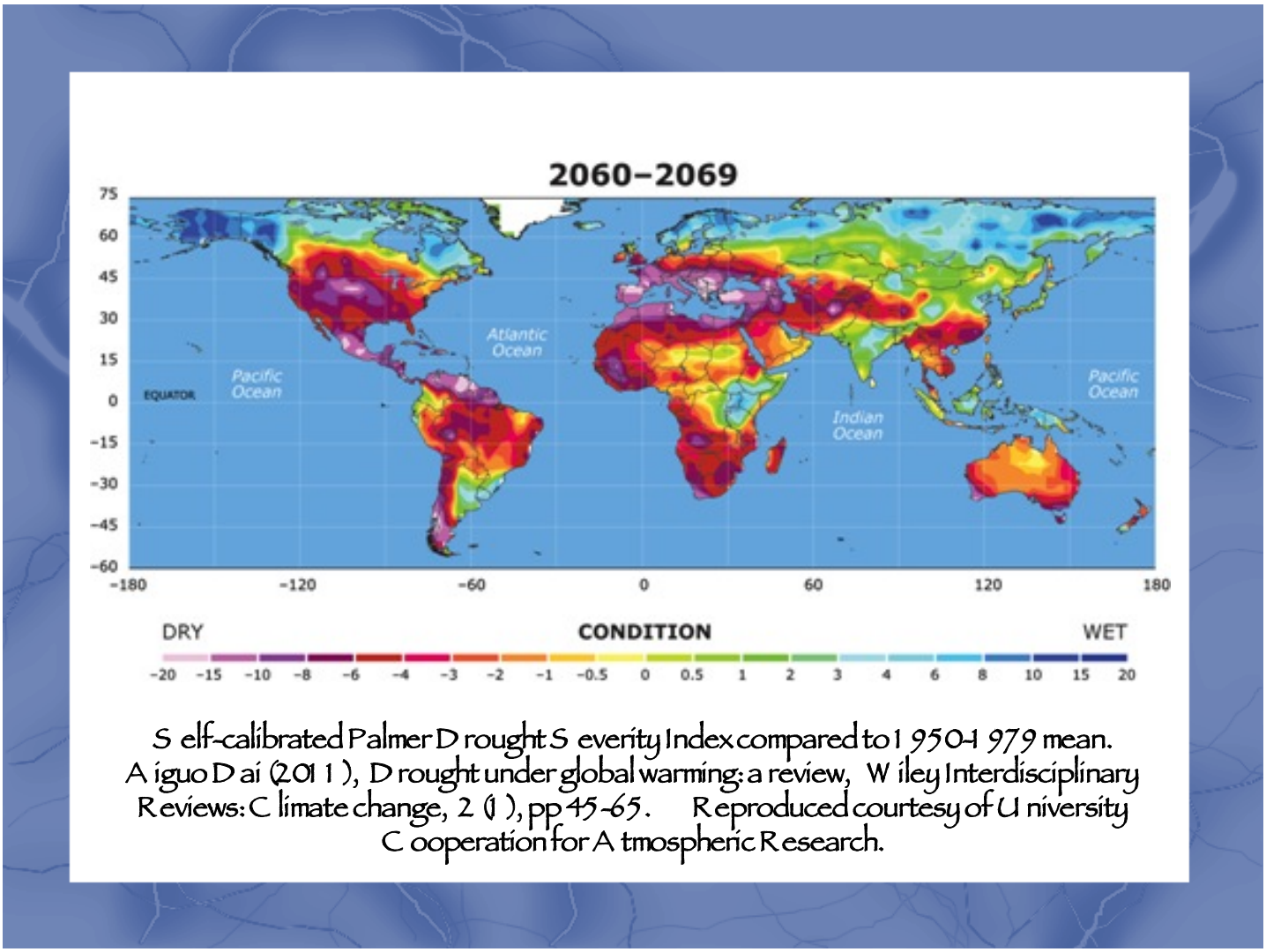


IPCC (2013)

1/18/2014 Climate Hearings, Nov. 2 2013 23

IPCC GRAPH PRESENTED AT THE HEARINGS BY DR. KIRSTEN ZICKFELD

Mark Bigland-Pritchard of Climate Justice Saskatoon outlined the projected impact that rising greenhouse gas emissions will have on drought conditions across the globe. **Droughts are expected to become more widespread and more severe over the course of this century**. Mark presented data projecting much drier climatic conditions over much of southern and central Europe, the Midwest and Southwest of the United States, Mexico, Central America, Brazil, Chile, Australia, the Middle East, parts of Pakistan and China, southern Africa, and large parts of northern and western Africa. He noted this projected trend has serious implications for reduced crop production and increased hunger and malnutrition.



SLIDE PRESENTED AT THE CITIZENS' HEARINGS BY DR. MARK BIGLAND-PRITCHARD

Dr. Christian Holz of Climate Action Network Canada discussed several critically important predictions the United Nations Intergovernmental Panel on Climate Change has reached consensus on, **should average global surface temperature on our planet rise by 2 degrees Centigrade or more above pre-industrial levels**. He emphasized that if this is allowed to happen, millions of people will experience coastal flooding. **Hundreds of millions of people will be exposed to more water stress.** There will be increasing morbidity and mortality from heat waves, floods and droughts. Production of cereal crops at low latitudes will decrease, with many subsistence farmers suffering crop losses. There will be a large rise in malnutrition, and in cardiovascular, infectious and diarrheal diseases. Moreover, **up to 30% of the species that humans share the planet with will be placed at increased risk of extinction**. Most coral reefs in the world will be bleached, putting their future at grave risk.

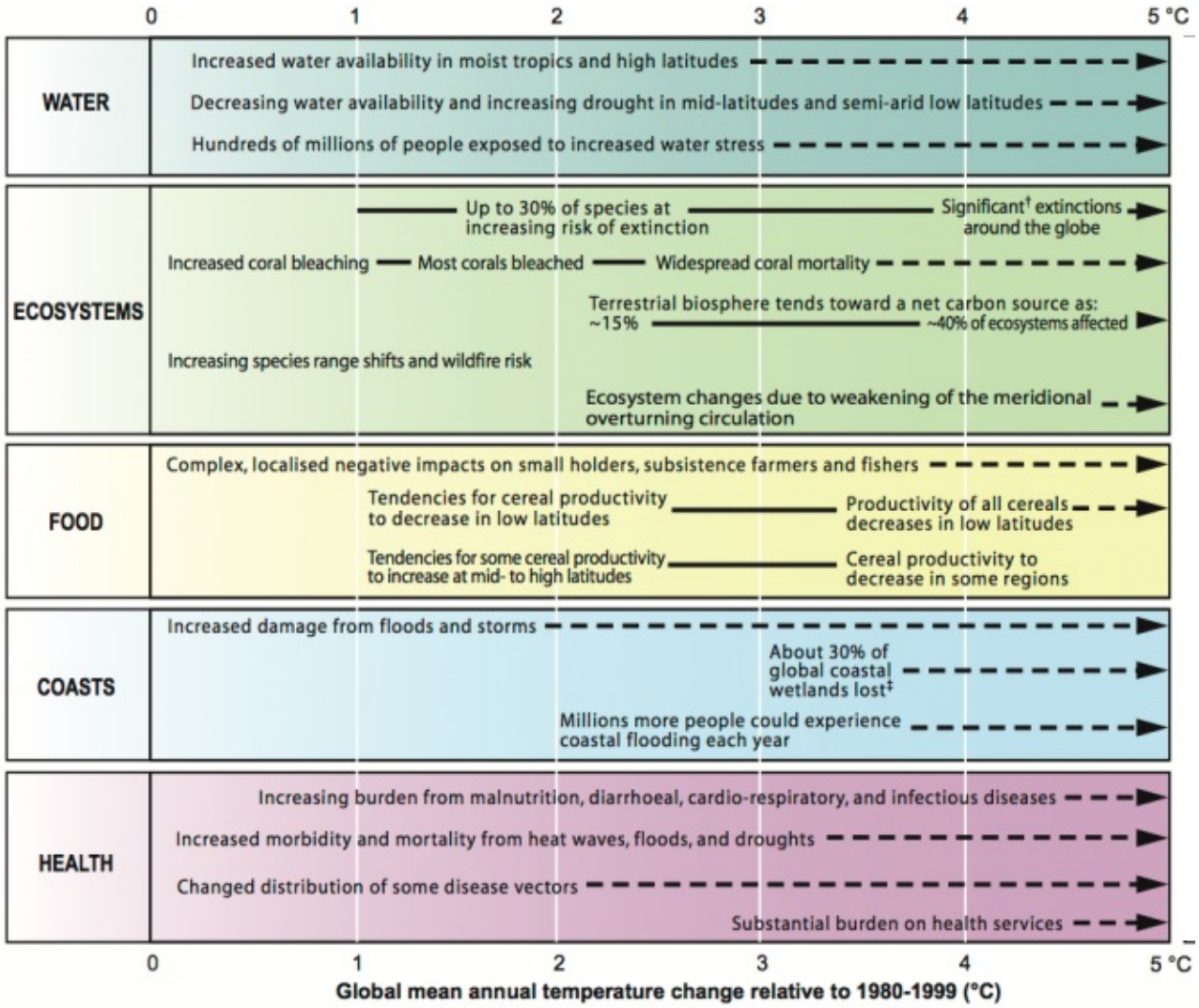


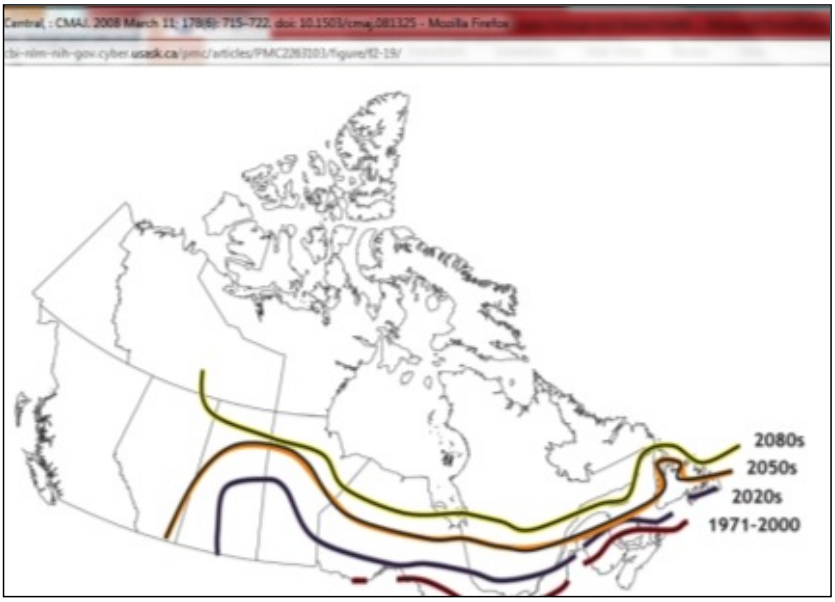
CHART FROM IPCC 2007 REPORT PRESENTED AT THE HEARINGS BY DR. CHRISTIAN HOLZ

Michael Swandt noted **that the worst health consequences from climate change will often be experienced in lower income countries that have the least to do with emitting greenhouse gas pollution in the first place**. These countries also tend to have the least monetary resources for adaptation to climate change. Meanwhile, many wealthier countries, which are disproportionately more responsible for greenhouse gas pollution, will not experience the health consequences as severely, by virtue of their more northerly geographical location.

This does not mean Canada will be unaffected. For instance, Michael Swandt presented data demonstrating that heat related deaths in Canadian cities such as Montreal will rise at least three fold by 2050 (assuming no adaptation or mitigation measures are taken), and perhaps much higher. He also presented projections for the spread of Lyme disease, which is expected to become more widespread in Saskatchewan, Manitoba and eastern provinces, as the climate warms.

Infectious disease

Projected distribution of *Ixodes scapularis* deer tick, vector for Lyme disease-causing *Borrelia burgdorferi* parasite (assuming constant greenhouse gas emissions)



Greer et al. Climate change and infectious diseases in North America: the road ahead. *CMAJ* 2008.

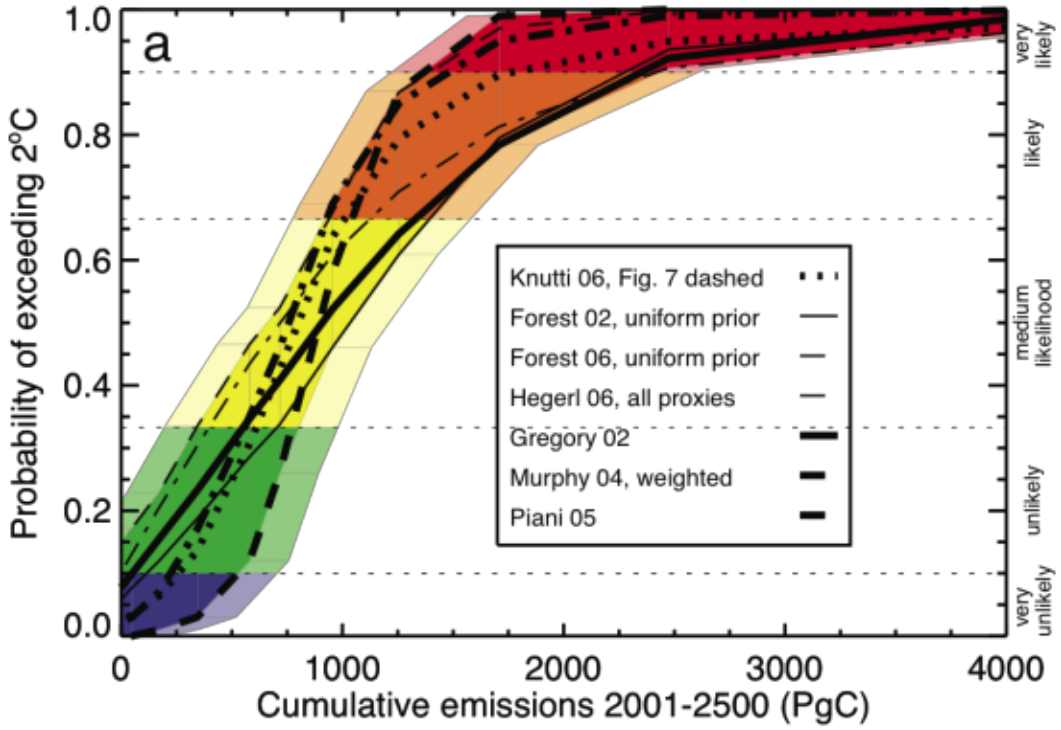
SLIDE PRESENTED AT THE HEARINGS BY MICHAEL SWANDT

6. Urgent Action Needed to Avoid a 2 Degree Centigrade Increase in Average Global Temperature and the Dangers That Come With It

Kirsten Zickfeld has worked to analyze what the world must do to avoid a 2 degree rise in average global temperatures – in other words, to avoid dangerous manmade interference with the global climate system. She explained to the Citizens' Hearings that **it is the accumulated emissions of carbon dioxide over time that will largely determine the surface warming of the Earth in this century and beyond.**

Kirsten presented a summary of her 2009 work on this topic. She explained that very deep reductions in fossil fuel use are required in order to keep cumulative carbon emissions below the levels necessary to avoid dangerous climate change. She stressed that it is important to go to zero human induced carbon dioxide emissions as soon as possible, in order to avoid the risk of crossing dangerous climate thresholds. She emphasized that **only a small fraction of current known fossil fuel reserves can be allowed to be developed and used if dangerous climate change is to be avoided.**

Probability of exceeding 2° C target



Global carbon budget for p<0.33: 590 GtC

Zickfeld et al., 2009

GRAPHIC PRESENTED AT THE HEARINGS BY DR. KIRSTEN ZICKFELD

Peter Prebble summarized for the Hearings the recently published work by the Intergovernmental Panel on Climate Change on this topic. IPCC scientists have reached a consensus that if the global community wants to have at least a 66% chance of avoiding dangerous climate change, it must ensure that a total of no more than 790 billion tonnes of human induced carbon is released into the atmosphere by human activity. (This estimate also takes account of methane and nitrous oxide concentrations in the atmosphere.) As of 2011, an estimated 515 billion tonnes had already been released. **Based on this IPCC analysis, that means that our global upper remaining limit is only another 275 billion tonnes of carbon**.

In the calendar year 2011 alone, 10.4 billion tonnes of carbon was released into the atmosphere from fossil fuel burning, cement production, deforestation and other land use change. **If this rate of carbon release continues, the global community will use up its entire carbon budget within another 25 years**. If the governments and people of the world wanted to achieve an even higher probability of avoiding dangerous climate change, then the time period before the carbon budget is used up would become even shorter.

This IPCC analysis once again suggests that exceptionally deep cuts in the use of fossil fuels are needed as quickly as possible. Darrin Qualman noted that accomplishing such a transformation of our energy systems and

related infrastructure will take decades, so this work must begin immediately. In effect, the world only has 25-30 years to completely change our civilization's heavy reliance on fossil fuels.

In light of the carbon budget realities we face, Mark Bigland-Pritchard proposed that developed countries must provide major leadership in combating climate change starting immediately. He suggested that developed countries should set a 2020 target of reducing greenhouse gas emissions at least 40% below 1990 levels. He cited an extensive analysis by senior Tyndall Centre scientists Kevin Anderson and Alice Bows (2011) which demonstrates that this is the scale of reduction required to give the international community a passable chance of staying below a 2 degree Centigrade global average temperature increase. Large annual reductions in emissions will also be needed by developing countries if the 2 degree Centigrade limit is to be achieved. (Refer to "Beyond 'dangerous' climate change: emission scenarios for a new world" by Anderson & Bows).

7. Climate Change - The Defining Moral Issue of Our Times

Climate change is not simply a scientific issue. It **is a moral issue that requires a moral response.** Kathleen Dean Moore, a well-known ethicist, encouraged participants to think about the things we value in our lives, and how we can save them. Without concrete action, she said, the nature of the climate change threat is so serious that by the time today's young children are middle aged, critical life support systems on our planet will have suffered irreparable damage. That will be the consequence of allowing average global temperatures to increase by more than 2 degrees C. Thus, our job as global citizens is to prevent this from happening. **Our job is to make life safe for all children who follow us.**

Kathleen Dean Moore emphasized how critical it is to get started immediately on major greenhouse gas emission reductions. If we begin now, she argued, we can still reach the United Nations goal of avoiding a 2 degree C temperature increase. To do so will require a 6% annual reduction in global emissions. If society delays starting until 2020, she said, a 15% reduction in annual greenhouse gas emissions will need to be achieved. If we wait until 2030 to get started, it will be too late.

While achieving deep emission reductions will not be easy, the alternative – namely wrecking the planet – has far more severe consequences and is fundamentally wrong. Kathleen Dean Moore argued that the economic path many have embarked on, of taking what they want and leaving a depleted planet for our children, is indefensible, as is the notion that we are too busy with our work, our families and our day to day lives to take action. Kathleen Dean Moore urged us to build consensus around the principle that human society is obligated to future generations to leave behind a world that is as rich and diverse as the one we inherited.

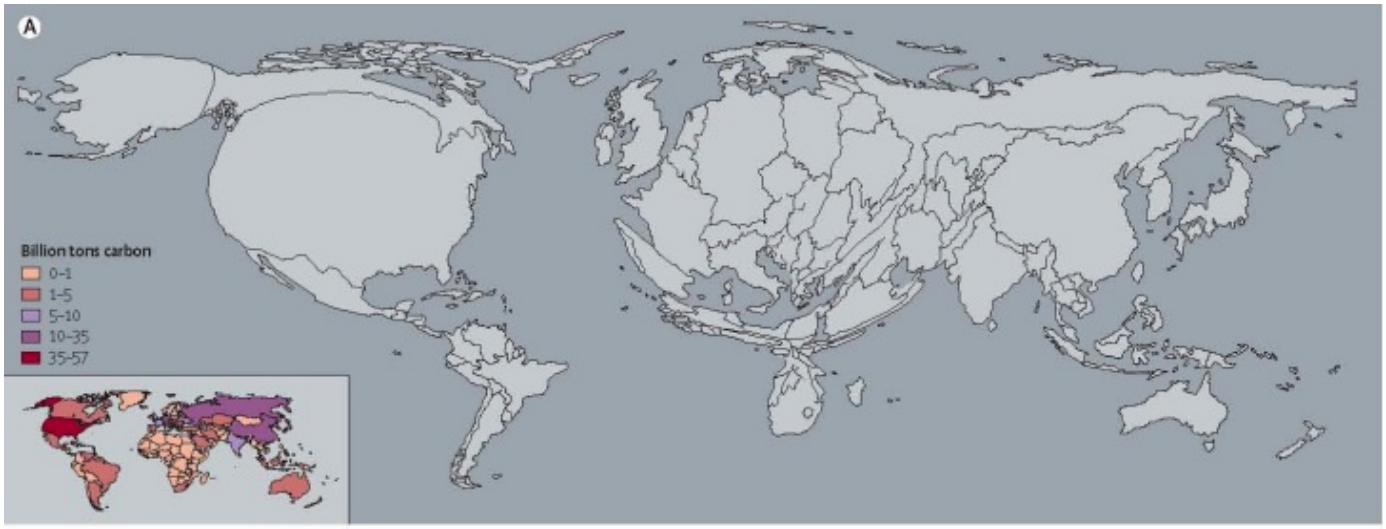
Kathleen Dean Moore laid out three reasons why we must protect the Earth, and why it is wrong not to do so.

First, she suggested that climate change is a violation of basic justice. It is clear that many citizens of our planet will unjustly suffer its consequences, particularly in developing countries. While a few people will become obscenely rich from the exploitation of fossil fuels, hundreds of millions who are powerless and voiceless will suffer terribly, as will future generations. Moore argued that climate change threatens to be the biggest human rights violation the world has ever seen.

Second, Moore asserted that we must protect the Earth for our children. They did not make the mess that society has collectively created. If we do not act, our children and their children will inevitably say: "Don't tell me you didn't know; don't tell me there wasn't time; don't tell me you didn't know what to do". Thus, climate change imposes enormous intergenerational injustice.

Third, Moore observed that our World was created by God. We should not think for a moment that God is indifferent to creation and what human beings are doing to it. The Earth is sacred, irreplaceable, and beyond human understanding**. Reckless destruction of the Earth is a failure of reverence.**

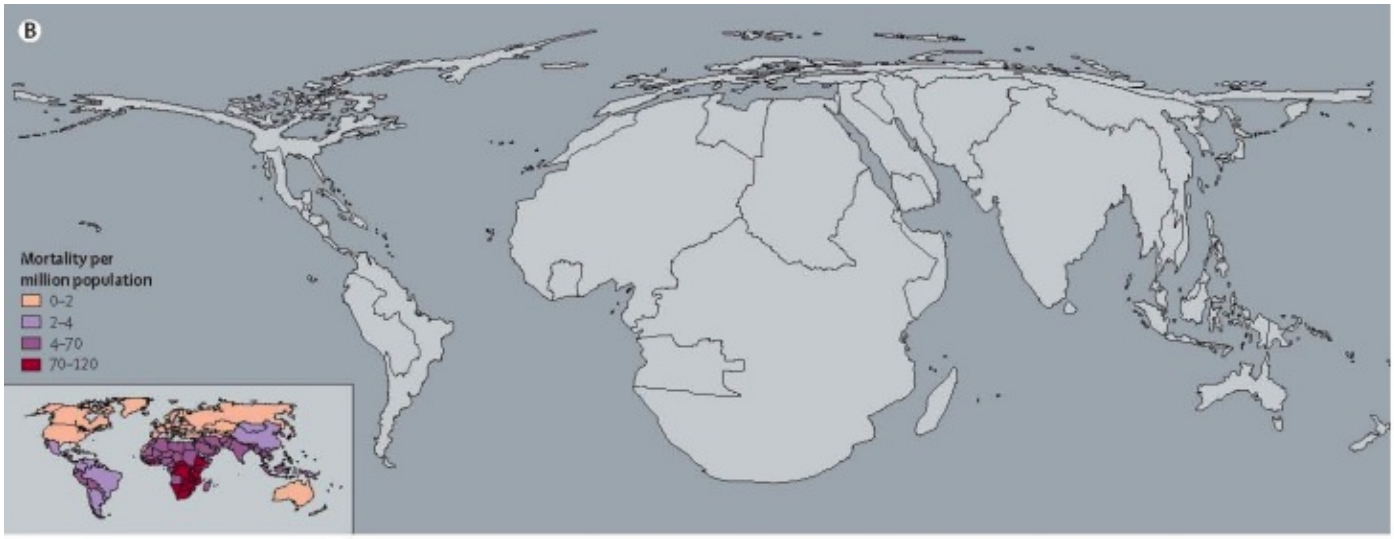
Christopher Hrynkow, a faculty member in the Department of Religion and Culture, at St. Thomas More College elaborated on the theme that climate change is a violation of basic justice. He presented visual evidence on **the sharp difference between the countries most responsible for greenhouse gas emissions on the Earth and the countries projected to experience the gravest consequences from those emissions.** He suggested that what we are doing with greenhouse gas pollution and other forms of ecological exploitation is ultimately a form of violence and impoverishment driven by the market economy.



cumulative CO_2 emissions by country for 1950–2000

Costello A, et al. "Managing the health effects of climate change." *Lancet* 373, no. 9676 (2009): 1693-1733.

SLIDE PRESENTED TO THE HEARING BY CHRISTOPHER HRYNKOW



regional distribution of four climate-sensitive health consequences (malaria, malnutrition, diarrhea, and inland flood-related fatalities)

SLIDE PRESENTED TO THE HEARING BY CHRISTOPHER HRYNKOW

What Is Blocking Society From Taking Action?

Kathleen Dean Moore noted how many of the world's large corporations are engaged in the externalization of shame. They blame us for driving our cars or flying, and they immobilize us by suggesting we are primarily to blame for climate change. Meanwhile, these corporations spend billions of dollars attempting to transform us into consumers, fracking oil and gas deposits, extracting tar sands, and undermining regulations in order to exploit the Arctic.

Kathleen Dean Moore also pointed to the massive moral failure of governments around the world to take action to reduce greenhouse gas emissions, particularly in light of the high certainty surrounding the basics of climate science. She noted that those who choose not to take action must either deny the science or deny the moral rights of our children. Given that choice, our opponents often seek to discredit the science.

Observations on an Ethical Path Forward

Kathleen Dean Moore suggested that **tackling climate change is about** reinventing the human condition, and **more clearly discovering our purpose on Earth. It requires us to recognize what we love too much to lose.** It is about designing an economy that actually gets us what we most value: time with our children, healthier food, and a cleaner environment.

Moore urged us to find a path between blind hope and blind despair, a path in which we act out of integrity, a path in which we find new ways to live sustainably, and a path in which we pursue "courageous, relentless citizenship". We will need to find creative ways to make our moral arguments whether that be through theatre, through humour, through truth telling, or through civil disobedience, she said.

Kathleen Dean Moore reminded us that we are in a life and death battle. Our "only home" is being destroyed. We should therefore reject adaptation as our first priority because ultimately we cannot adapt to the worst consequences of fossil fuel emissions. Similarly, we should reject further delay in the form of Royal Commissions and studies. Rather, we must let our voices be heard: No coal trains! No oil sands pipelines! No Liquefied Natural Gas Plants! "We must not lose heart; we were made for these times", she concluded.

Karri Munn Venn of Citizens for Public Justice brought a faith based perspective on climate change to the Citizens' Hearings. She reminded participants that biblical history has seen other examples of where leaders failed to heed the warnings of their prophets, and the environment suffered as a result. For example, when Jeremiah's warnings and prophecies were not heeded, the local land based economy was devastated, and there was increased suffering among the poor. Karri emphasized that part of loving God must be caring for and advocating for creation.

Karri Munn Venn spoke to **the need to embrace the sacred, curb our appetite for consumer goods, and change our lifestyle**. In other words, some sacrifice will be needed for the larger well-being of the planet. Care of the Earth, she noted, is our oldest responsibility, and our only hope. It needs to be a fundamental part of our life journey.

Karri Munn Venn referred to climate change as the sum result of destructive corporate greed and unsustainable patterns of production and consumption. She stressed the importance of ending more than one billion dollars in Canadian government subsidies to the fossil fuel industry each year, and increasing public investment in alternate energy.

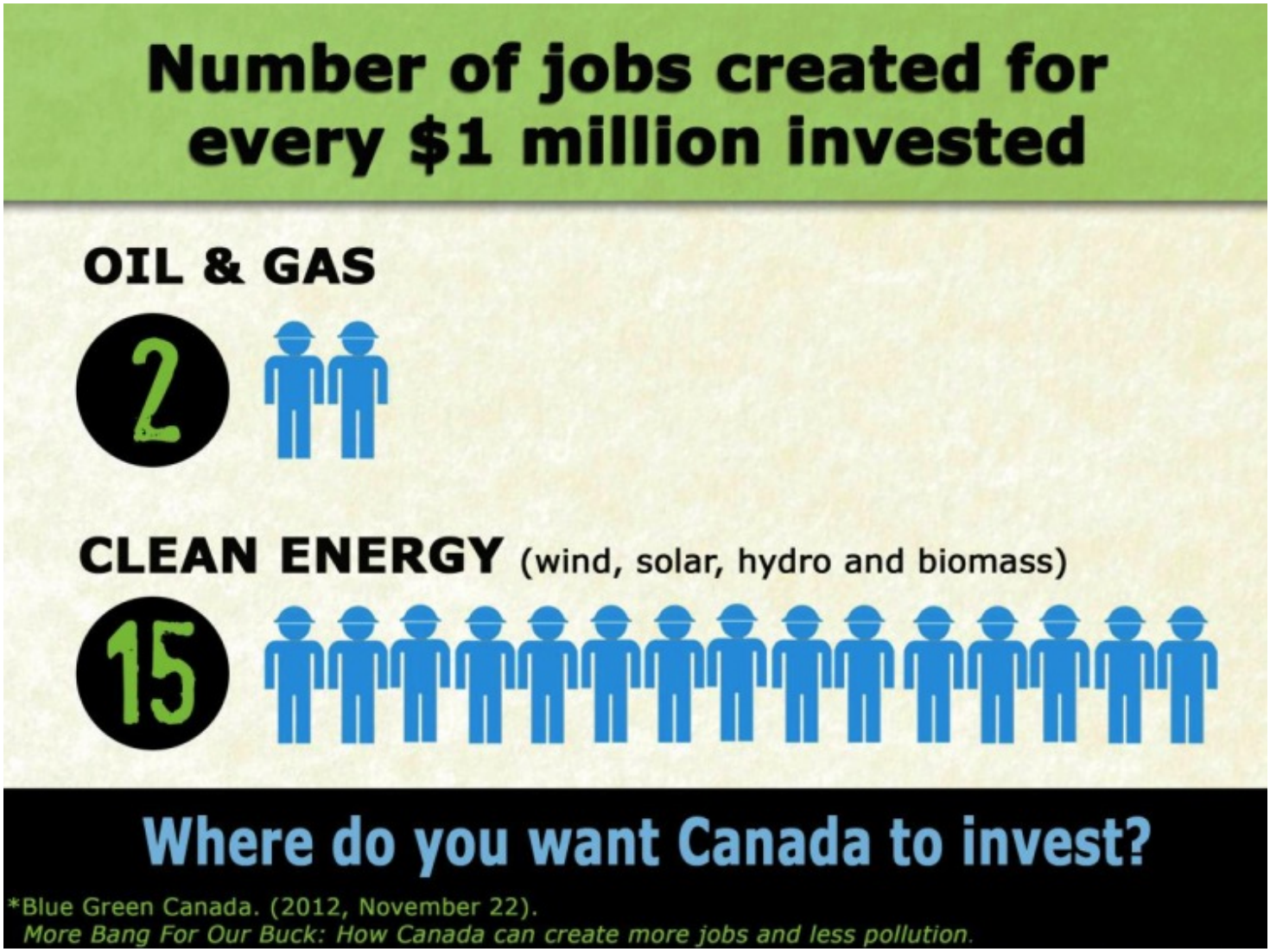
US Bishops, Governance and the Common Good

- "Responses to global climate change should reflect our interdependence and common responsibility for the future of our planet. Individual nations must measure their own self-interest against the greater common good and contribute equitably to global solutions."

-Global Climate Change: A Plea for Dialogue, Prudence and the Common Good, , USCCB, 2001 #15

SLIDE PRESENTED AT THE HEARINGS BY CHRISTOPHER HRYNKOW

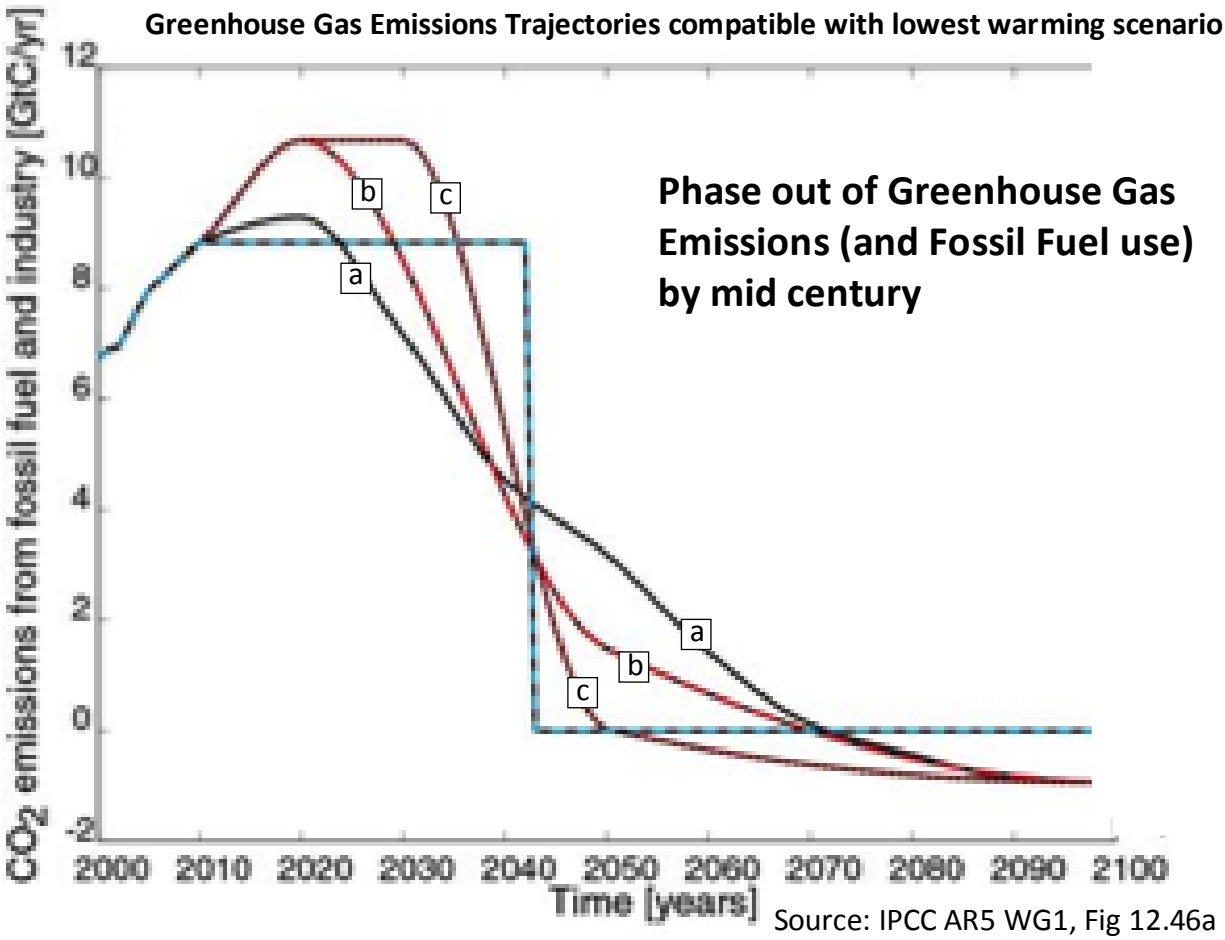
Christopher Hrynkow of St. Thomas More College, in reflecting on the path forward, quoted from *The Franciscan* (May 2011, Brother Hugh SSF): "Our whole way of life - our food, clothes, houses, transport, entertainment and even religion as we practice it - all are based on fossil fuels..... I believe that continuing to emit more than a tiny amount of CO_2 is something to be avoided as soon as possible". He stressed that social justice and the well-being of the Earth are closely interrelated and that both should be pursued. He also emphasized that "anthropogenic climate change is a failure of both good global governance and specific governments." **In the future, governance practices need to pay more attention to limits to growth, to our interdependence, and to our common responsibility for the planet, he said.**



SLIDE PRESENTED AT THE HEARINGS BY DR. CHRISTIAN HOLZ

Christian Holz spoke to the need for a just transition in the phase out of coal, oil and natural gas in North America. He pointed out that a far larger number of jobs are created from investments in clean energy than are created from equivalent investments in oil and gas. This fact will assist with the transition process.

Holz reinforced the moral imperative to act quickly, stressing that **the more we delay reducing greenhouse gas emissions, the deeper the annual cuts by the global community will have to be.** He presented analytical work done by the Intergovernmental Panel on Climate Change that illustrates this point. As shown by the graph below, early action on fossil fuel reduction will extend the length of time that some fossil fuel use continues to be possible, without exceeding a temperature rise of 2 degrees Centigrade (above pre-industrial). Without such early action, fossil fuel phase out will need to be complete by 2050.



Source: IPCC AR5 WG1, Fig 12.46a

SLIDE PRESENTED TO THE HEARINGS BY CHRISTIAN HOLZ

Christian Holz urged the adoption of a 35 year transition plan for fossil fuel phase-out. He stressed that we will need to wind down our fossil fuel extraction industries in Canada, and added that governments should support workers in the coal, oil and natural gas industries through this transition process. Putting in place alternative employment opportunities in sectors such as mass transit, renewable energy and energy conservation will be critical.

Christian Holz also stressed the need for a fair agreement on fossil fuel phase out among all countries. **The burden of greenhouse gas emission reduction must be equitably shared**. He suggested that given Canada's exceptionally high emissions level, and Canada's failure to take action to reduce emissions up to this point in time, our country's obligations for fossil fuel phase-out in the coming decades should be heavier and deeper than European countries (which have been steadily cutting emissions for 15 years) or developing countries.

Rick Morrell, Executive Director of the Saskatchewan Eco-Network reminded the audience that at the end of the day, **our aim should be not just to avoid the catastrophic effects of climate change, but to create a better, more equitable, more sustainable world.**

Our Future Can Be Better!

Image Sources; http://alancoonerty.wordpress.com/;http://annamitch.wordpress.com/

SLIDE PRESENTED TO THE HEARINGS BY RICK MORRELL

8. First Nations Leadership in Challenging Corporate Practices that Cause Greenhouse Gas Pollution

Many First Nations people in Canada find themselves on the front lines of the climate change struggle, as they oppose oil sands and coal extraction projects in their own backyards.

Wendy Lerat and Sue Deranger addressed the Citizen Hearings in a joint presentation. Wendy shared observations from First Nations elders she has sought advice from. They recognize that life is sacred, she said, and that: "we are at a point where it is the global climate crisis that threatens our life".

Wendy shared with those present that we need to find a common direction to address climate change. Many communities are already being critically affected, she said. "This is the hour for action."

Sue Deranger noted that Aboriginal people have a different way of knowing climate change, because they are close to the land, and they are seeing the effects on the land, and on animal migration and patterns of behaviour. It is important that society incorporate the knowledge and perceptions of First Nations people in order to successfully address climate change.

Building on this theme, Wendy Lerat observed that Aboriginal people across the world are part of the land, and "like the land have suffered institutional oppression". We are struggling to see past all the obstacles we face under the guise of economic development, she said.

Sue Deranger pointed to Fort Chipewyan, Alberta, as one example of that struggle. Since the development of the oil sands industry, the community of Fort Chipewyan has seen a very worrisome increase in cancer, and their whole way of life is being changed. The "carbon deals" of the oil sands industry increasingly leave us "homeless" in our own community Sue said. Many residents are trying to resist the oil sands industry, but they are also victims of it.

Sue Deranger and Wendy Lerat observed that under the UN Declaration of Indigenous Rights, First Nations people have the right to be a fundamental part of the decision making process on matters related to economic development and climate change. "We are at a place of reawakening", they said. "We must stand with allies who seek system change and harmony with all life forms".

Sue and Wendy advised the Commissioners that tackling climate change will require a deep commitment from community members. We need to find different ways of engaging the voices of people in order to build a global network of solidarity on the climate issue, they said.

It is critically important to engage local community voices. **"Grass roots voices must drive the climate change engagement process", they said.**

Wendy Lerat and Sue Deranger also emphasized the importance of enforcing the treaties between First Nations and the Government of Canada. Enforcement of the treaties can be an important vehicle for achieving change, including better protection of the environment. The original intent of the treaties, they said, was to promote friendship and peace, to live under the natural laws, never to use what is below the depth of the plough, never to take up arms, to be able to live side by side in harmony together. "We are all children of the Earth; we need to respect all voices, and respect and love Mother Earth", Wendy and Sue concluded.

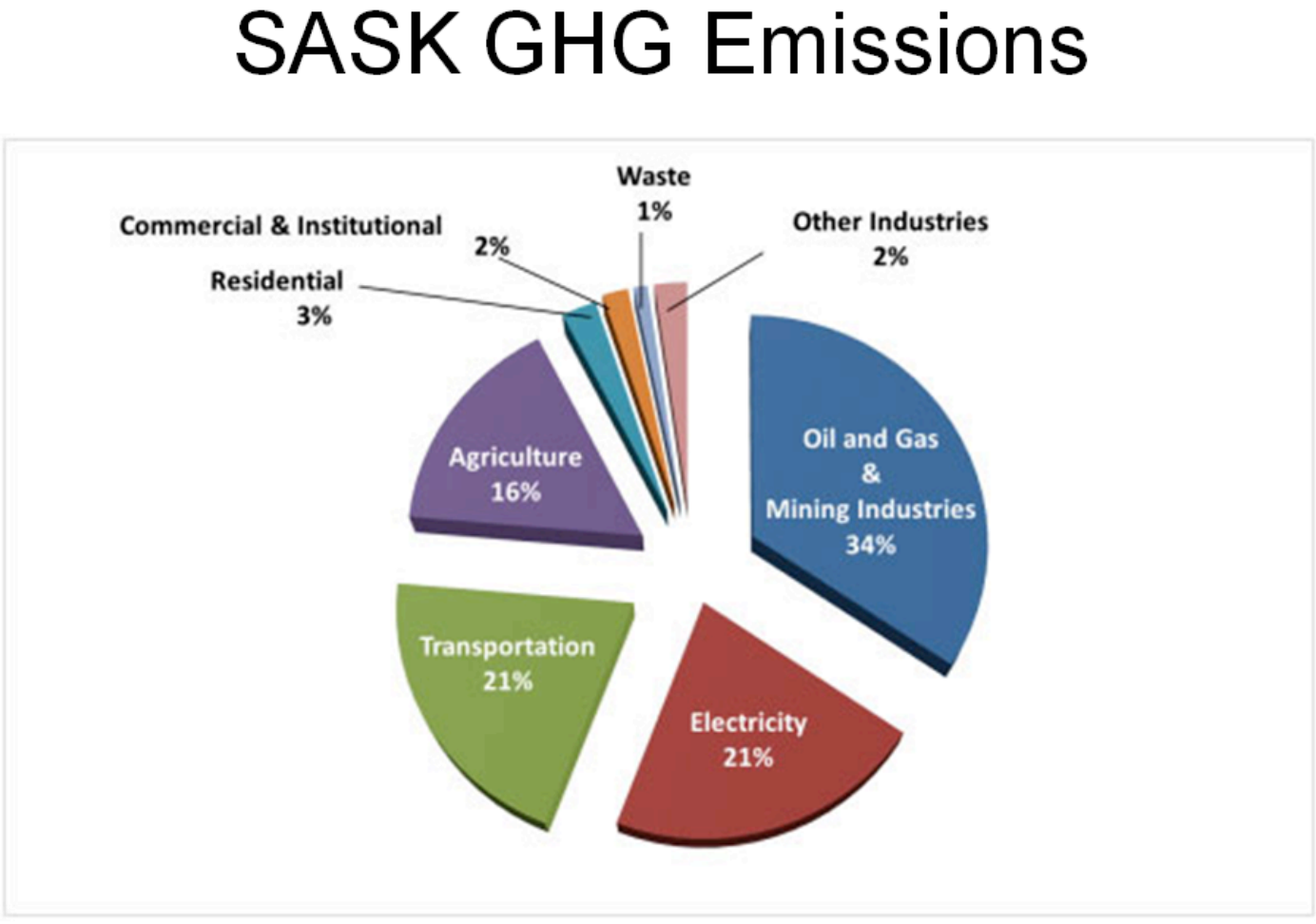
Janelle Pewapsconias of Little Pine First Nation elaborated on the issue of enforcing treaties in her presentation to the Hearings, in the context of discussing water sovereignty rights. Janelle noted that section 35 (1) of the Canadian Constitution recognizes the existence of Aboriginal and treaty rights. **In order to exercise its rights under the Canadian constitution, a First Nations band must have a continuous relationship to the land in question.**

Janelle Pewapsconias explained that under section 91 (24) of the British North America Act First Nations have the expectation of the fiduciary obligation of Canada, as well as strengthened rights that stem from inherent rights. (Fiduciary duty is the obligation of the government to protect First Nations lands and waters as a result of the agreement, which was a nation to nation agreement.) Treaties made a declaration that all rights to the land and waters were surrendered, but she is of the view that **the inherent right of governance, management and use of the land and waters was never surrendered.**

9. Steps the Saskatchewan Government Should Take to Reduce Greenhouse Gas Emissions

Provincial governments have within their jurisdiction a great many of the policy tools available to reduce greenhouse gas emissions. The Citizens' Hearings heard considerable evidence on steps the Saskatchewan Government could take to achieve large emission reductions.

In setting a course for emission reduction, it is naturally important to be clear about where the major sources of emissions are in our province. Toddi Steelman reported to the Hearings that one third of Saskatchewan's greenhouse gas pollution is produced by oil and gas extraction and refining, and by mining. 21% of Saskatchewan emissions are the result of SaskPower's electricity generation choices, and another 21% are associated with the transport sector. These three sectors alone account for 76% of Saskatchewan's annual release of greenhouse gas pollutants into the atmosphere. **Saskatchewan, with 3% of Canada's population accounts for approximately 10% of Canada's greenhouse gas emissions.**



SLIDE PRESENTED AT THE CITIZENS' HEARINGS BY DR. TODDI STEELMAN

It is also important to clarify for Saskatchewan residents that the scientific debate over human causation of climate change is over, and to provide residents with important scientific information on the global consequences of continuing to use fossil fuels at current levels. As Rick Morrell, Executive Director of the Saskatchewan Eco-Network explained: "Climate change is happening, it is real and it is caused by humans as attested by 100% of national academies of science and 97% of scientists in relevant research fields."

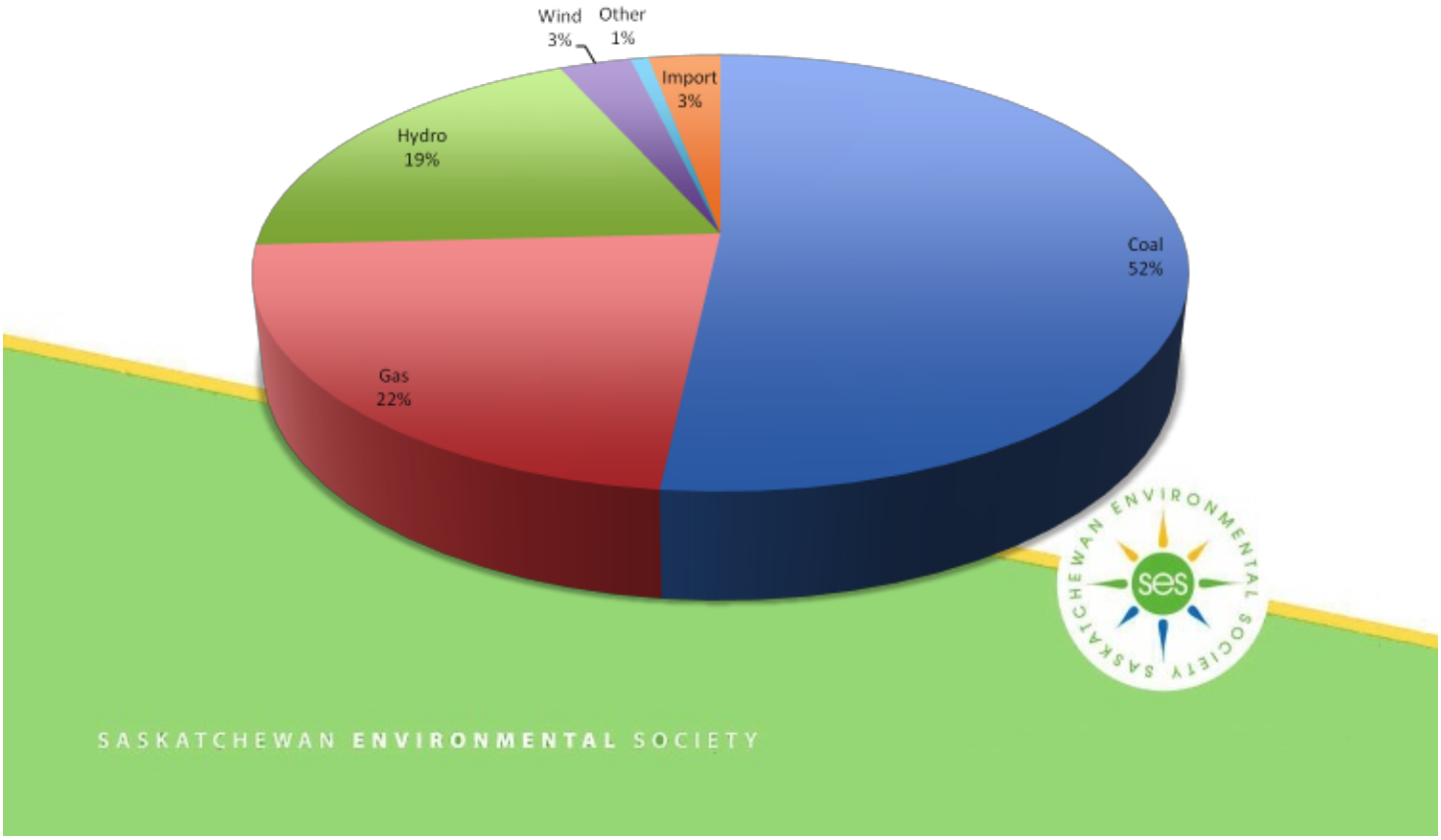
Mark Bigland-Pritchard of Climate Justice Saskatoon provided an overview of the kind of policy measures needed to substantially cut provincial emissions. He stressed the importance of **reducing venting and flaring in the Saskatchewan oil and gas industry to the absolute technical minimum**, and suggested enacting legislation to enforce these measures. He advocated **phasing out coal fired power plants as rapidly as possible,** and suggested that SaskPower follow the example of Ontario's government, which has steadily closed coal fired power stations over the past decade. Ontario will complete the job in 2014. Mark Bigland-Pritchard also urged the adoption of an ambitious energy efficiency target, combined with rapid growth of renewable electricity. He stressed the importance of promoting community run renewable energy facilities in order to maximize economic benefits for local people.

Mark Bigland-Pritchard identified other priorities. In the building sector he urged the adoption of stricter energy efficiency codes for new building construction. In the agricultural sector he suggested that industrial meat production be discouraged because it is a source of large methane releases. He proposed instead that encouragement be given to organic agriculture and to local agricultural self-sufficiency, including the development of a Saskatchewan greenhouse industry.

Bob Halliday, a member of the Saskatchewan Environmental Society, focused his presentation on steps that could be taken to reduce greenhouse gas emissions by SaskPower. He noted that most of SaskPower's coal fired generating units will reach the end of their useful lifetime over the next 15 years. For instance, the units at the Boundary Dam Generating Station in Estevan will have all reached the end of their operating lifetime by 2025, while the units at Popular River Generating Station in Coronach will reach the end of their operating life in the period 2025-2028.

Bob Halliday advocated that each of the generating units at these power stations be replaced by a mix of cleaner sources that would include: electricity conservation, co-generation of electricity, and installation of hydro, wind, solar and biomass facilities. The one exception would be Unit 3 at the Boundary Dam Power Plant which is in the midst of being converted to Carbon Capture and Storage at a cost of over $1.3 billion. If all this were to be successfully completed, the Shand power station would be the only conventional coal fired power plant left operating in Saskatchewan by 2028.

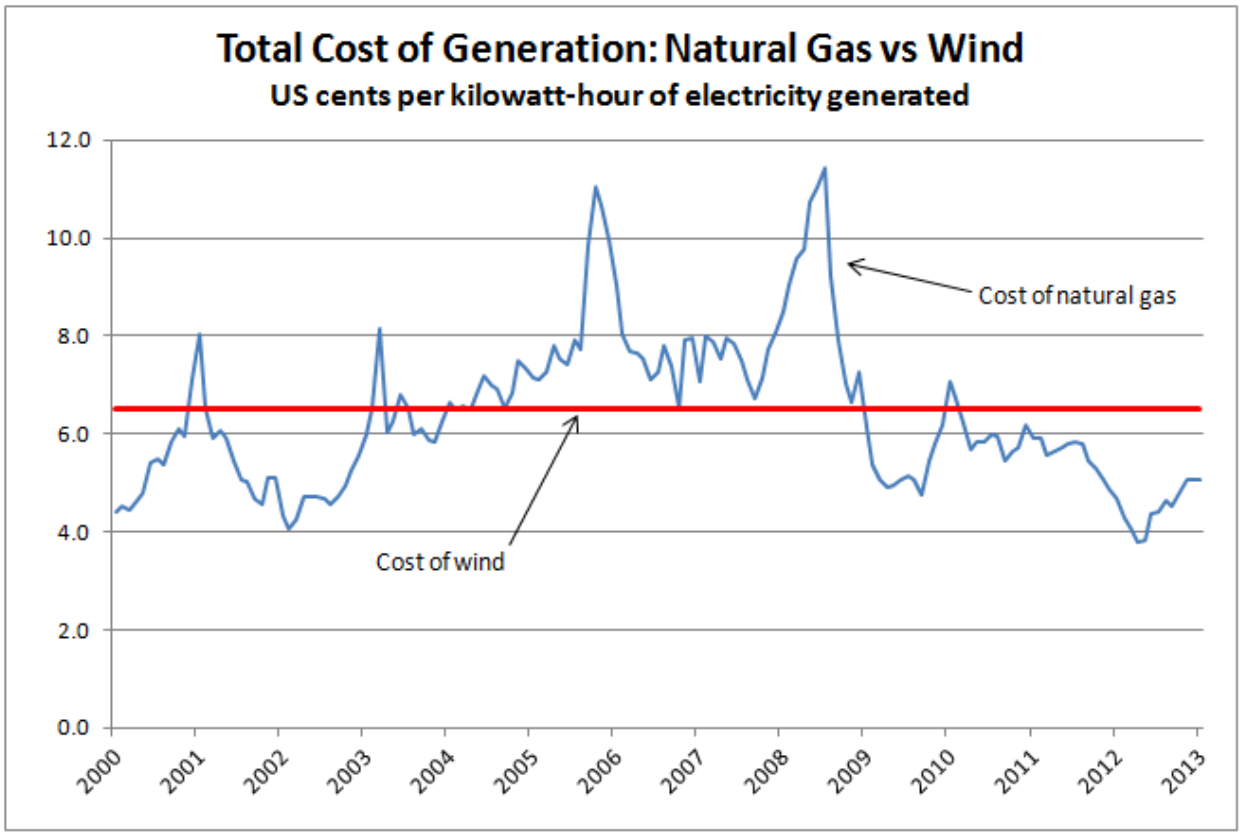
SaskPower Annual Production



SLIDE PRESENTED TO THE HEARINGS BY BOB HALLIDAY

Bob Halliday emphasized the importance of maximizing electricity conservation opportunities, and establishing a stronger grid connection with Manitoba. He estimated that **electricity efficiency savings equivalent to 800 megawatts of capacity** could be achieved in Saskatchewan over the next 20 years, and that this could be implemented at far less cost than building new electrical generating capacity. He also suggested that Saskatchewan contract with Manitoba Hydro to import 1,000 megawatts of hydro power. Such a contract would go a considerable way to helping phase out Saskatchewan's coal fired power plants, and would allow hydro to better complement a large roll out of new wind power facilities. Hydro and wind power production can be coordinated together at very low cost.

James Glennie of Saskatoon Community Wind stressed the enormous opportunities that exist for Saskatchewan to utilize its excellent wind resource for electricity generation purposes. He noted how much the economics of wind power have improved, bringing it to the point where it is only slightly more expensive to build and operate a wind farm than it is to build and operate a natural gas fired power plant.



SLIDE PRESENTED TO THE HEARINGS BY JAMES GLENNIE

Saskatchewan currently generates only 3% of its electricity production from wind. James pointed to numerous studies confirming that 20% of a province or state's electricity can readily come from wind power, without compromising grid stability. In fact, south of the border, **the states of South Dakota and Iowa** have already demonstrated this can be done. Both **now generate 25% of their electricity from their wind turbines,** while 8 other U.S. states get more than 10% of their electricity from wind. There is little question Saskatchewan could do the same.

James Glennie further underlined the potential Saskatchewan has for the development of wind power and other renewable sources by contrasting Saskatchewan's land area with that of Germany. Saskatchewan has approximately double the land area of Germany, and has a far superior wind, solar and biomass resource. Yet **in a geographical area half the size of Saskatchewan, Germany currently generates enough electricity from solar, wind and biomass energy to meet all of Saskatchewan's electricity needs 6 times over**.

2012 Saskatchewan Total Generation vs. German Renewables

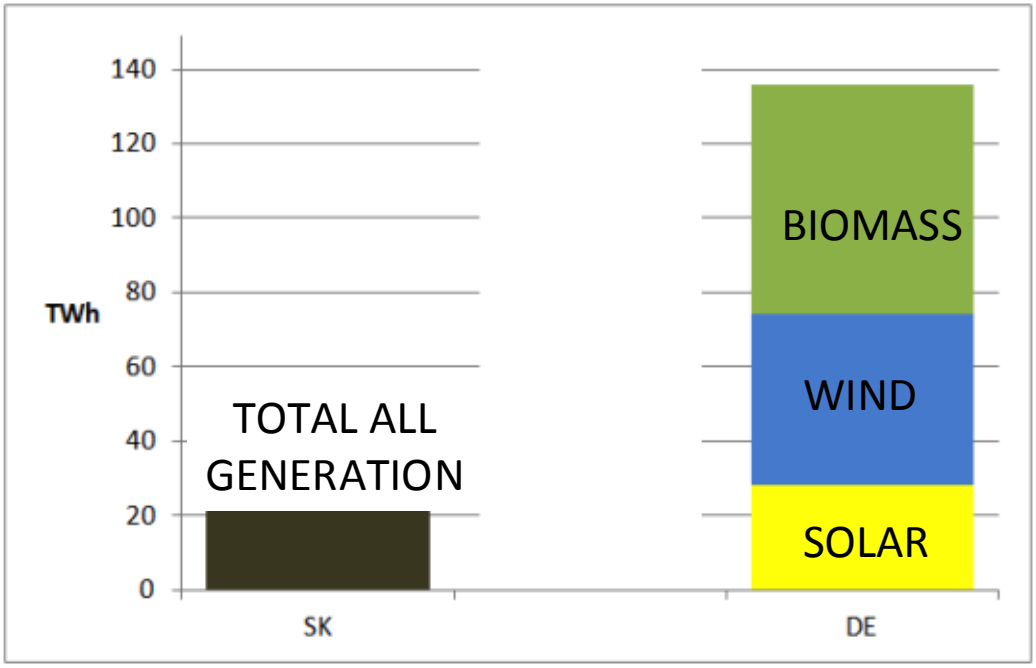


CHART PRESENTED TO THE HEARINGS BY JAMES GLENNIE

This chart compares Saskatchewan's total electrical production from all sources with Germany's electrical production solely from renewable energy sources. Germany's renewable electricity production occurs in a geographic area half the size of Saskatchewan, suggesting that Saskatchewan has tremendous renewable energy potential.

Rick Morrell of the Saskatchewan Eco-Network addressed emission reduction measures that should be taken in several other sectors of the Saskatchewan economy. For example, in the transport sector, he advocated working towards a future in which electric vehicles would play a major role, and in which 100% of transport would ultimately be powered by renewable energy. He also stressed the importance of the Province investing in municipal infrastructure to support walking, cycling and transit use.

2) 100% renewable transportation

(21% of emissions in 2011)

To be achieved by 2050 or sooner.

- Primarily electric vehicles;
- Biofuel from sustainable feedstocks used for specific purposes only (eg: tractors);
- Improved urban design for bicycles and buses;
- Electric powered mass rapid transit between cities;
- Legislation to improve fuel efficiency during the transition to renewables.

SLIDE PRESENTED TO THE CITIZENS' HEARINGS BY RICK MORRELL

Rick Morrell proposed several other important emission reduction policy measures. These included improving the efficiency of space heating across the province, moving to renewable heat sources, shifting to a locally based food supply, and adopting zero waste management (a strategy aimed at reducing both consumption of products and waste from them).

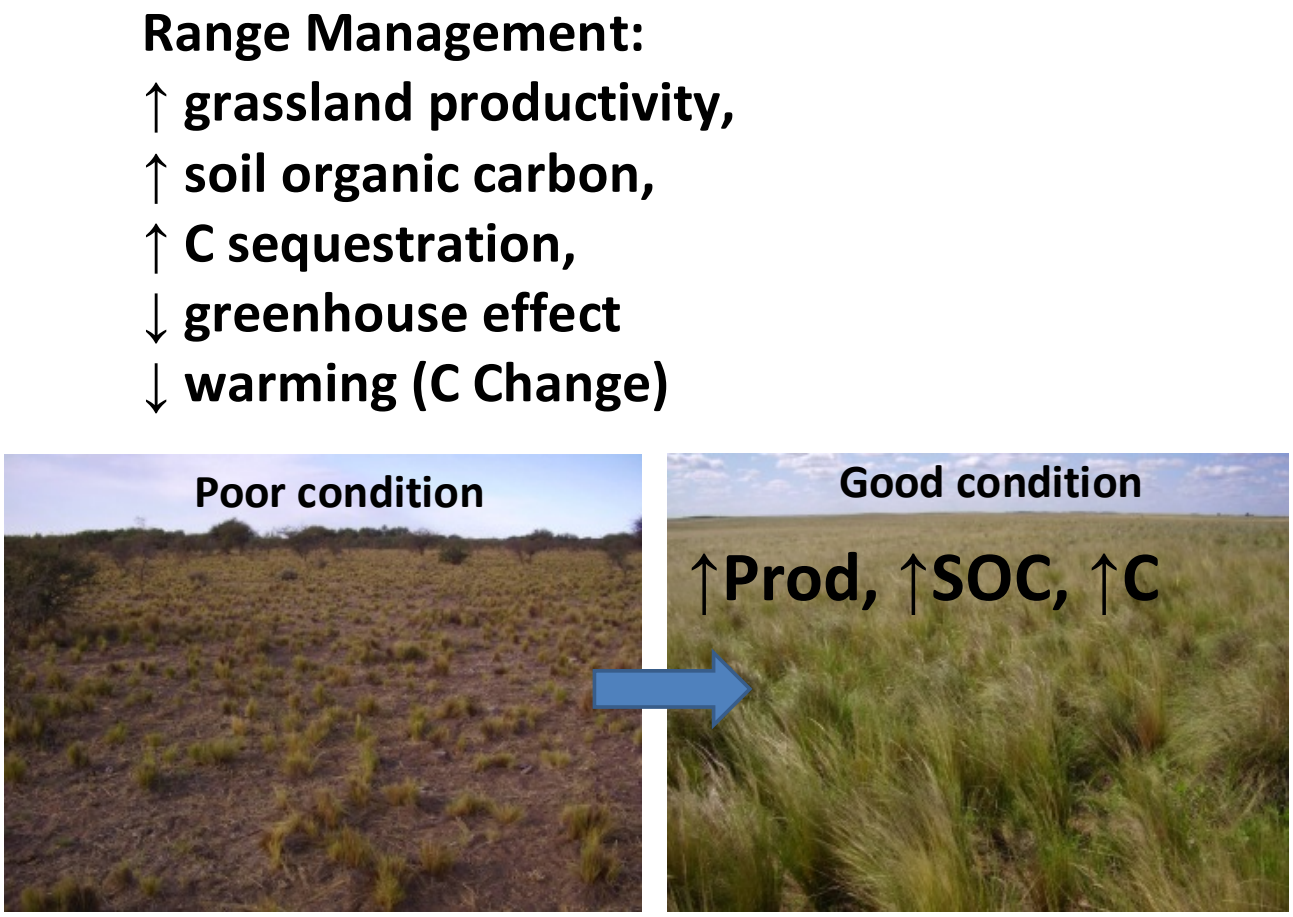
Rick also suggested launching **a massive tree planting program around our cities, designed to sequester carbon, while at the same time providing a lot of fuel to meet local space heating needs.** Farmers who initiated tree planting projects would gain an important new source of revenue. Moreover, he identified other spinoff benefits including: better flood control, enhanced recreational opportunities, and provision of more natural habitat for wildlife.

Rick Morrell also addressed changes the Saskatchewan Eco-Network Climate Group believes are needed in resource extraction policy. He suggested that all mining operations in our province should be required to transition over to renewable energy as a way of reducing their carbon footprint. He proposed that all subsidies for any type of resource extraction in Saskatchewan be terminated. He recommended a provincial ban on fracking because of its associated methane emissions and the risks it poses for water quality. Finally, he advocated higher royalty rates on any remaining fossil fuel extraction, and proposed that half of these royalties be directed towards building renewable energy installations in Saskatchewan.

Diego Steinaker, a member of the Biology Department at the University of Regina has done extensive research into the role of grasslands in capturing carbon. He demonstrated that policies that promote grassland health in

turn result in large improvements in the ability of grasslands to hold carbon that would otherwise be released into the atmosphere. For instance, **by moving from heavy grazing on grasslands to lighter grazing, 20% more carbon can be sequestered by plant roots**.

Diego Steinaker's research shows that rotational grazing practices - that allow grasslands to rest and rejuvenate - can play an important role in reducing greenhouse gas emissions into the atmosphere. The key is to manage grasslands so as to more evenly distribute livestock grazing pressure. This has important implications for management of provincial community pastures and for farm management practices across Saskatchewan.



SLIDE PRESENTED AT THE HEARINGS BY DIEGO STEINAKER

10. The Need for Federal Government Leadership on Climate Change

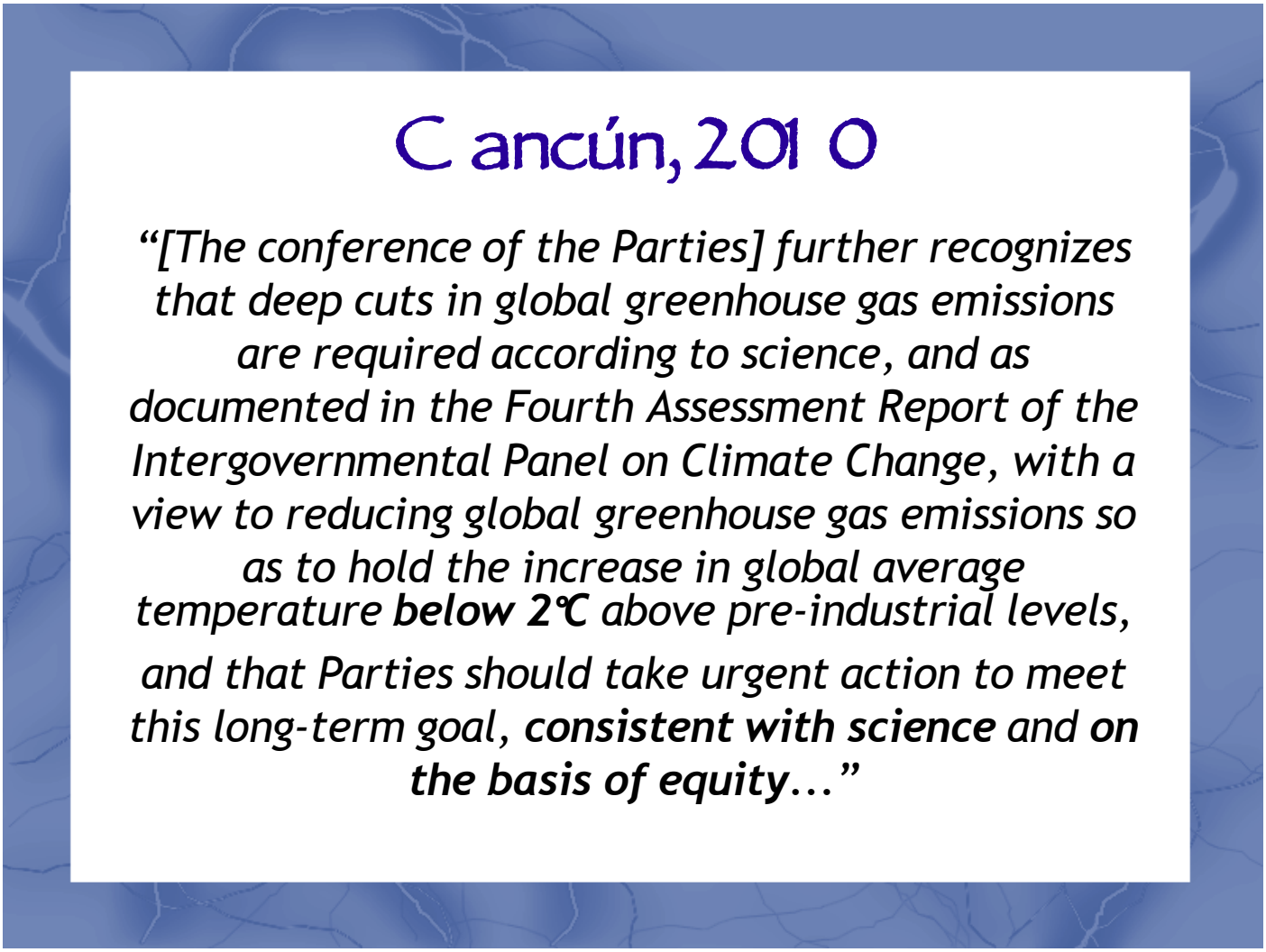
It is the Government of Canada that has ultimate responsibility for providing leadership on greenhouse gas reduction in Canada. Clearly, our national government cannot achieve its goals without strong co-operation from provincial and municipal governments. However, it is the Government of Canada that in the end decides whether or not to bind our country with respect to entry into and compliance with international agreements on greenhouse gas reduction.

The Government of Canada also sets important rules for vehicle fuel efficiency, air emission standards at power plants, and air emission standards adopted by the oil and gas industry. Moreover, Ottawa plays a major role in incenting oil and gas exploration, subsidizing fossil fuel extraction, and determining whether large oil sands

projects with inter-provincial impacts will receive approval. If it chooses to, Ottawa has a broad array of spending and taxation powers that can be used to discourage fossil fuel consumption, and foster more sustainable forms of energy development.

The federal government is fully aware of the findings of the United Nations Intergovernmental Panel on Climate Change. However, it has chosen not to follow the advice of the IPCC. This is perhaps most clearly underlined by Prime Minister Harper's decision to withdraw Canada from its obligations under the Kyoto Protocol. Under Kyoto, Canada would have been obliged to achieve a reduction in greenhouse gas emissions of 6% below 1990 national emission levels by 2012. Canada's 1990 emission levels were 592 million tonnes (carbon dioxide equivalent).

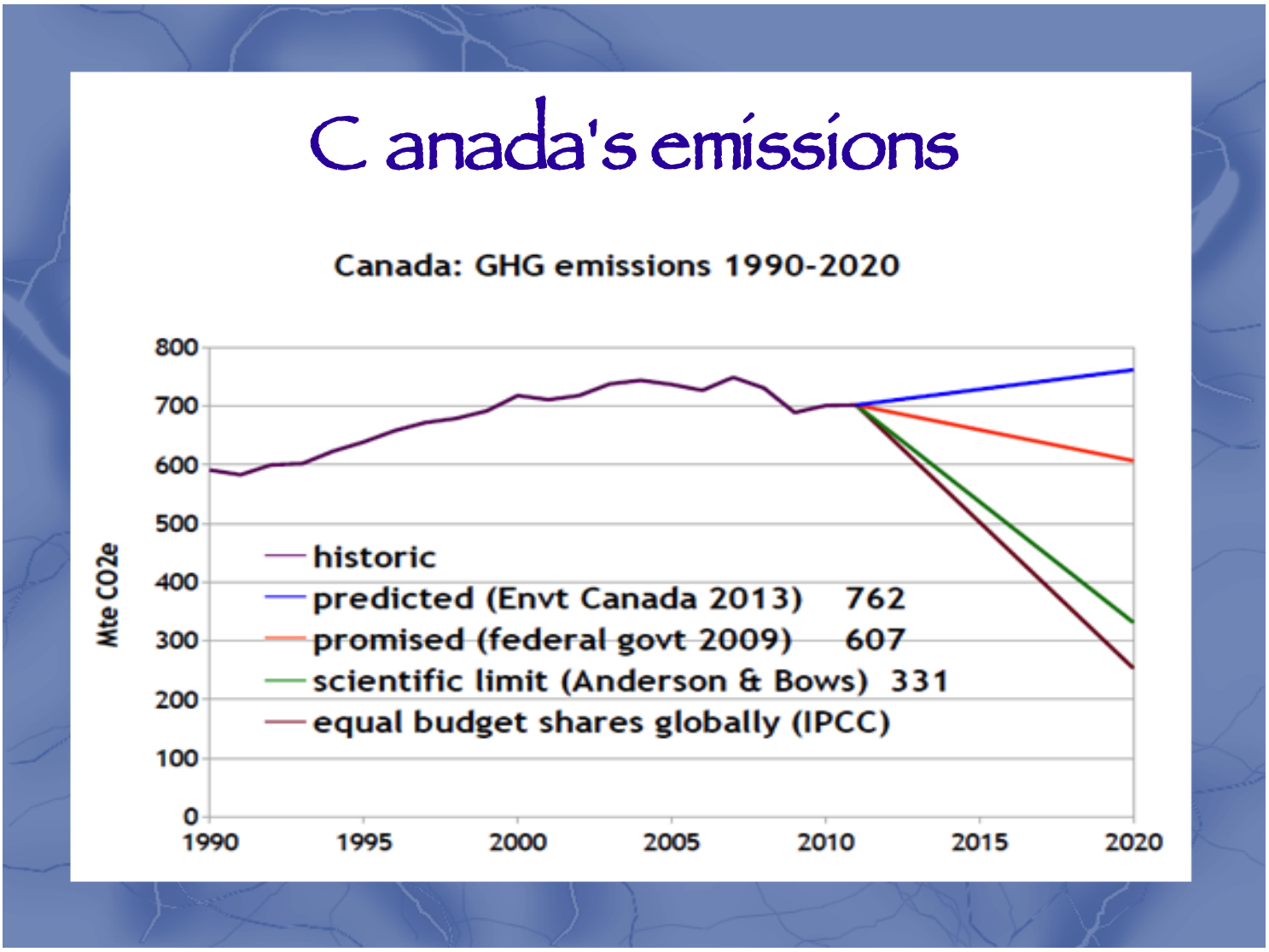
Mark Bigland-Pritchard noted that Canada has become a signatory to the Cancun agreement, which is summarized below. Commitments made at Cancun were of a voluntary nature, and frequently lack ambition, but they did include strong representation from both developed and developing countries. In that context Canada has pledged a modest greenhouse gas emissions reduction of 17% below 2005 emission levels by 2020.



SLIDE PRESENTED AT THE HEARINGS BY DR. MARK BIGLAND-PRITCHARD

To date, with the exception of improvements in vehicle fuel efficiency in Canada, the Government of Canada shows little sign of adopting policy changes that would allow it to meet its 2020 target. To the degree that small

national emission reductions have been achieved, they have largely been carried out at the provincial level, such as Ontario's work to phase out coal fired power plants, and British Columbia's carbon tax.
Mark Bigland-Pritchard noted that the new federal emission reduction targets bear little relationship to advice being given by the climate science community, which would require far deeper emission cuts. Moreover, a recent report from Environment Canada predicts that national emissions are set to rise again, driven up by growth in Canada's oil sands industry.



SLIDE PRESENTED AT THE HEARINGS BY DR. MARK BIGLAND-PRITCHARD

Mark Bigland-Pritchard, Kerri Munn Venn and Rick Morrell all suggested important policy changes at the federal level. Bigland Pritchard advocated further regulations and incentives to improve vehicle efficiency in Canada, and to advance the performance of electric vehicles. He also proposed the elimination of $1.4 billion in federal subsidies to the fossil fuel industry.

Mark Bigland-Pritchard and Rick Morrell advocated shutting down all further development of the tar sands in Canada, and prohibiting approval of bitumen pipelines to move tar sands crude. **Three to four times more energy is used to extract oil from tar sands, compared to extraction of conventional oil.** Thus, the extraction process has a much larger greenhouse gas pollution footprint.

Karri Munn Venn stressed the importance of strictly regulating greenhouse gas emissions in the oil and gas sector, and increasing public investment in alternate energy. She expressed her disappointment in the federal government's lack of action in both these arenas. She also drew attention to **the success of the revenue neutral B.C. carbon tax in reducing greenhouse gas emissions in that province,** and urged the adoption of a national carbon tax.

Mark Bigland-Pritchard and Peter Prebble encouraged those attending the Citizens' Hearings to consider the idea of a national feed in tariff to promote renewable energy, a policy measure which has now been adopted by more than 60 countries. Under such a policy, premium rates are paid to homeowners, farmers, and businesses for installation of solar, biomass, geothermal and community wind power projects, reflecting the actual cost of these installations. In the absence of action by the Government of Canada, **the provincial governments of Ontario and Nova Scotia have adopted feed in tariffs**, but the rest of Canada has not.

Rick Morrell, also suggested federal incentives be provided for the installation of district heating systems, a means by which communities can heat with hot water or steam, with distribution of that heat managed by a central energy management facility in each neighbourhood or municipality. Morrell explained that by transitioning to hot water or steam for space heating, the energy needed to heat the water can be provided by a renewable energy source.

Finally, Diego Steinaker provided a valuable national perspective on the potential impact of improving grasslands management in Canada. He noted that more than half of Canada's 22 million hectares of rangeland are in poor condition due to overgrazing**. By improving range management in Canada and moving to lighter grazing practices, an additional 13 million tonnes of carbon can be stored.** That is the equivalent to taking 2.4 million vehicles off the road.

11. The Importance of a Strong Relationship with Nature

Residents are more likely to be motivated to pursue individual actions that protect the environment or support public policies that mitigate greenhouse gas pollution, if they feel connected to the natural world. Several speakers addressed this theme.

Gail Mackay spoke to the importance of each of us having a relationship with nature and the land, if we are going to protect our future. She particularly focused on promoting youth's relationship to the land as a way to help them retain hope in the face of climate change. She described how the universal experience of awe is an awareness of a power beyond human comprehension. "Self-knowledge in relationship to the land helps a person feel comfort and serenity of being", Gail said.

Gail emphasized that as parents, teachers and mentors we can offer youth the experience of being in nature, so they may interpret awe in their own way. We can make time for them to experience solace in nature, and give them respite from a digital environment. She suggested we need to trust nature to teach them, and to trust youth's yearning for self-knowledge and their energy-charged disposition to fulfill the responsibilities of their stage of life. "We can give youth the chance to press the limits of their energy and abilities. We can provide opportunities for them to do work and take action that is recognized and celebrated as significant and valuable." Gail cited the examples of the kind of work that is being done in educational programs such as Ecoquest and Ecology Camps at the University of Saskatchewan.

Anthony MacKay, a grade eight student in the Ecoquest program, presented his ideas about the importance of ecological education and connecting with nature. He talked about his experience of hands-on learning about the Earth, beginning in preschool where they had weekly visits from a naturalist, an assortment of class pets, and regular field trips to learn in the natural environment.

Anthony talked about the Ecoquest way of learning, where the learning environment is frequently outside the formal classroom. He explained how an ecological education helps a person to know how they can interact in an ecosystem without causing harm to other species. Learning about nature also means learning how not to fear animals or the environment, he said. He reminded the hearings of a quotation by Chief Dan George, who wrote "what you do not know, you will fear. What one fears, one destroys."

Anthony MacKay emphasized that "an ecological education helps a person feel connected to a place as their physical and spiritual home. Our generation, by learning more about nature through ecological education, may help the effort to slow the destruction of the environment which we are all dependent upon", he concluded.

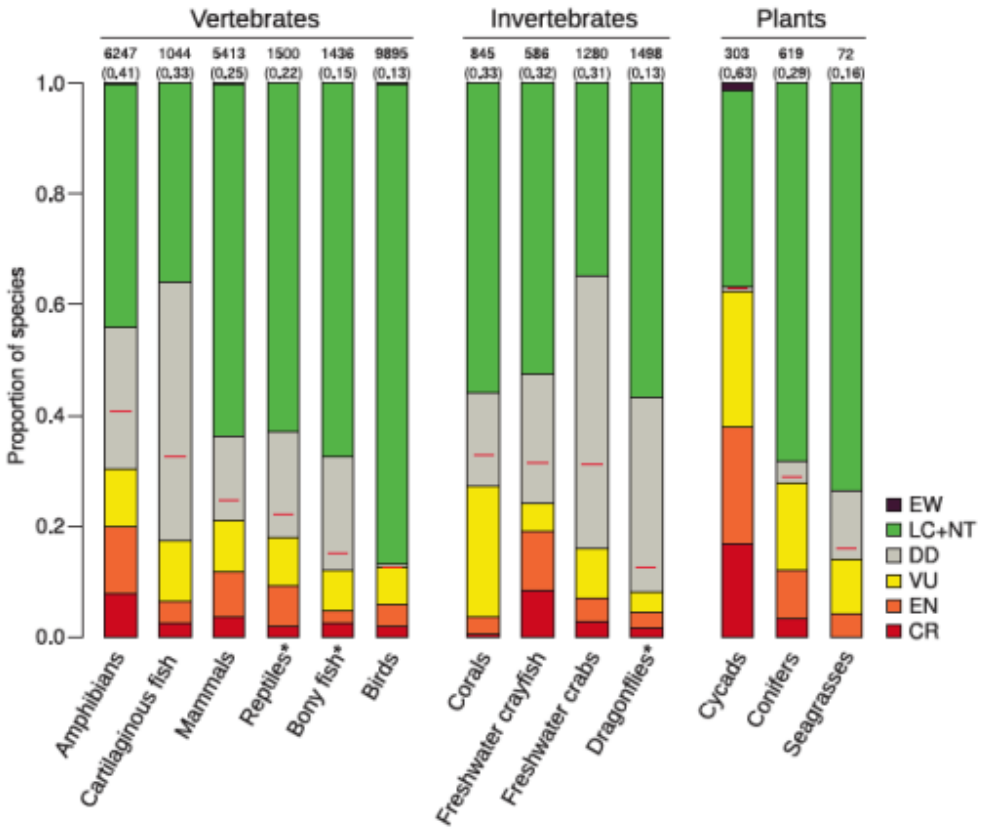


Fig. 1. The proportion of vertebrate species in different Red List categories compared with completely (or representatively) assessed invertebrate and plant taxa on the 2010 IUCN Red List (*15*). EW, Extinct in the Wild; CR, Critically Endangered; EN, Endangered; VU, Vulnerable; NT, Near Threatened; LC, Least Concern; DD, Data Deficient. Extinct species are excluded. Taxa are ordered according to the estimated percentage (shown by horizontal red lines and given in parentheses at tops of bars) of extant species considered Threatened if Data Deficient species are Threatened in the same proportion as data-sufficient species. Numbers above the bars represent numbers of extant species assessed in the group; asterisks indicate those groups in which estimates are derived from a randomized sampling approach.

SLIDE PRESENTED TO THE CITIZENS' HEARINGS BY CANDACE SAVAGE

Candace Savage pointed out that the human population of the Earth is becoming increasingly urbanized. Canada is no exception. 81% of Canadians now live in urban areas. In the urbanization process, there is a risk that citizens can become cut off from nature, and therefore care less about preserving it.

Candace drew our attention to the rapid increase in the number of species that are threatened with extinction due to a variety of environmental factors including fragmentation of habitat, pesticide use and climate change. The numbers are deeply concerning as the chart below illustrates.

Candace Savage therefore **proposed that residents of Saskatoon attach special importance to Saskatoon becoming a more 'nature-friendly city'** – a community where residents are fully aware that they rely on the natural world for their wellbeing. Those residents in turn will care about the consequences of climate change for our planet, and work to prevent it.

"We already know that what happens to life on Earth will depend on how people live in cities."

--Oliver Hillel, Montreal
UN Secretariat of the Convention of Biodiversity,
Feb. 17, 2013

SLIDE PRESENTED TO THE HEARINGS BY CANDACE SAVAGE

A nature-friendly city will encourage human powered transport – "you need to be on your bike or walking to experience nature", Candace said. **A nature friendly city will support more home gardens, more community gardens, more green roofs, more planting of street trees, more use of natural drainage, and**

more natural habitat for birds and wild bees. These actions help to preserve biodiversity and simultaneously help to sequester carbon, thus reducing atmospheric greenhouse gas emissions.

SLIDE PRESENTED TO THE HEARINGS BY CANDACE SAVAGE

12. Building a Low-Carbon Local Community: Actions at the Household and Municipal Level

There is much that can be done at the household and community level to build a future with very low greenhouse gas emissions.

Many individuals are already providing important examples in their own lives of what can be accomplished at a household level. Important work is also being done in our neighborhoods, in our community institutions, and by municipal government. It is critically important that this work be advanced and accelerated in the decade ahead.

Brent Veitch of Rock Paper Sun Ltd. reminded the Hearings that there are many low cost, simple things we can do in our lives to reduce our greenhouse gas footprint. We can bike or walk instead of driving our vehicle. We can buy locally to avoid the emissions associated with transporting consumer items long distances. We can grow plants and trees that will absorb carbon dioxide from the atmosphere. Brent shared with the hearings a list of straight forward changes we can all implement.

What can we do to reduce our GHG Footprint?

- Be open, learn and do.
- Walk, bike or bus instead of drive.
- Clothesline instead of clothes dryer.
- Eat veggies and a bit less meat.
- Grow plants, help with a garden.
- Use a push lawn mower instead of gas or electric.
- Turn down the furnace a degree or two.
- Buy local products (farms market, local craftspeople)
- Let the sun shine in.
- Join a wind co-op!
- Solar Oven, Solar water heater, solar electricity.

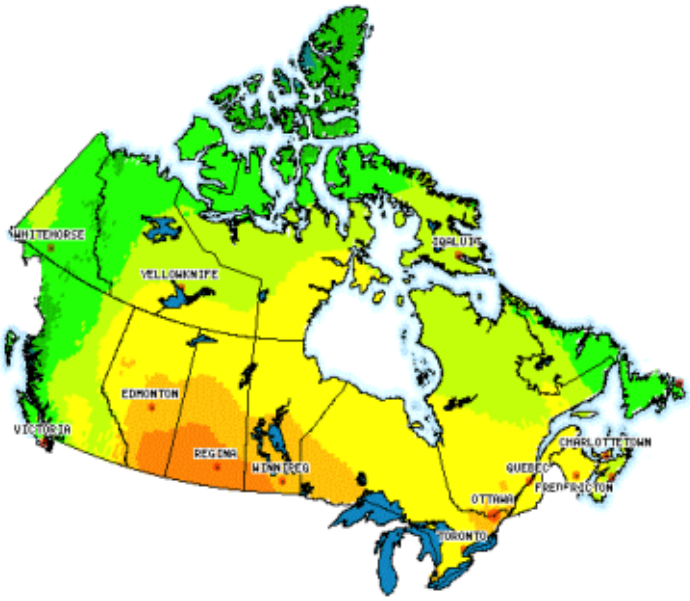
SLIDE PRESENTED TO THE HEARINGS BY BRENT VEITCH

Brent Veitch also reminded us that Saskatoon and southern Saskatchewan have wonderful access to sunlight, a benefit that is available to help us reduce our greenhouse gas emissions. **Our exceptional solar resource is equivalent to that found in many parts of California, Hawaii and Spain, where solar energy is widely utilized at both the household and community level.**

Brent Veitch explained that the installation of residential solar can help cut a home's greenhouse gas emissions by over 10 tonnes of carbon dioxide per year. Solar electric systems are becoming more financially attractive as the cost of solar photovoltaic panels falls, while the price of electricity we purchase from SaskPower keeps rising. Meanwhile, a solar domestic hot water system with a glycol loop can meet a large portion of a home's annual needs for hot water, and can also be tied into a radiant in-floor heating system.

Solar Resource

As reported by RETScreen software



City	Lat	Tilt	OUTPUT
Ghanzi Botswana	22°S	27°	2050
Pheonix AZ	33°N	30°	1954
Cairo Egypt	30°N	25°	1803
Saskatoon SK	52°N	50°	1761
Estivan SK	49°N	47°	1755
Regina SK	50°N	48°	1753
Los Angeles CA	34°N	28°	1746
Honolulu HI	21°N	17°	1733
Palea Equ. Guinea	1°S	5°	1730
Moose Jaw SK	50°N	48°	1705
Prince Albert SK	53°N	52°	1691
Dalas TX	33°N	28°	1691
Calgary AB	51°N	49°	1660
Madrid Spain	40°N	32°	1655
Edmonton AB	53°N	51°	1632
Miami FL	26°N	22°	1598
Winnipeg MB	50°N	45°	1558
Gravelbourg SK	50°N	44°	1512
Maple Creek SK	50°N	41°	1500
Val Marie SK	49°N	43°	1482
Albany NY	43°N	35°	1434
Ottawa ON	45°N	38°	1392
Toronto ON	44°N	34°	1376
St Clair MI	43°N	32°	1353
Stony Rapids SK	59°N	51°	1345
Halifax NS	45°N	37°	1331
Vancouver BC	49°N	32°	1242
Amsterdam Holland	52°N	37°	1163
Berlin Germany	52°N	40°	1070

SLIDE PRESENTED TO THE HEARINGS BY BRENT VEITCH

Angie Ortlepp of Suncatcher Homes emphasized the importance of careful house design for fully utilizing the benefit of the sun's energy and in reducing greenhouse gas emissions. To begin with, it is important to build into the design adequate south facing roof space for a solar installation. Home interiors need to be designed to make full use of sunlight in winter, while ensuring the sun doesn't overheat rooms during the hot summer months.

Angie Ortlepp stressed that proper building orientation, proper placement of windows and overhangs, and adequate thermal mass are all critical considerations when new house construction is being planned. Moreover, city and town planners need to ensure that lots in new subdivisions are laid out in such a way as to ensure good solar access for future homeowners.

The Right Design Makes all the Difference

In the winter, when the sun shines and it's -30⁰ outside it is 22⁰ inside just from the sunshine.

In the summer the sun doesn't shine into the room and the house stays cool.

suncatchersolar.com

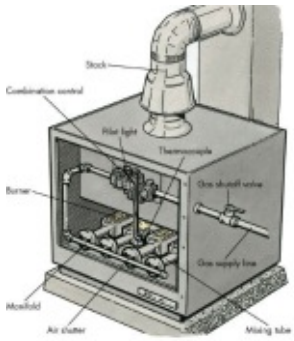
SLIDE PRESENTED TO THE HEARINGS BY ANGIE ORTLEPP

Shane Wolff emphasized that good home design must always include adequate insulation. An upfront capital investment in extra insulation can pay large dividends over the lifetime of a house by reducing greenhouse gas emissions associated with the heating and cooling of your home, while at the same time slashing your heating and air conditioning costs. **Shane** also **encouraged the installation of LED lighting which uses one eighth of the electricity of conventional incandescent bulbs.**

Shane Wolff stressed the importance of conducting an energy audit when retrofitting your home, so that energy and financial savings can be accurately identified. Similarly, **when new homes or commercial buildings are constructed, independent verification of their energy efficiency should be standard practice.** Shane Wolff urged that home owners pursue certifications such as Energy Star, R2000, and Energuide for new homes, and always arrange for third-party inspections. Similarly, new commercial buildings should be built to LEED standards, and should be properly commissioned by a qualified inspector.

Home as a system - Math

+ ($10,000 to $20,000)



- ($2500 to $6000)

- ($3000 to $10,000)

= SAME APPROXIMATE INITIAL COST & lower operating costs

More insulation means less need for heating and cooling. Smaller or potentially no heating or cooling system is necessary. This saves on equipment costs and ongoing operating costs.

www.FutureProofMyBuilding.com 9

SLIDE PRESENTED TO THE HEARINGS BY SHANE WOLFF

As Rob Dumont of Saskatoon has illustrated with both his own home and others he has helped design**, it is now cost effective to construct new homes that use 80-90% less natural gas for space heating than a conventional home does**. This can be done for incremental construction costs of 10-12%, and payback times are excellent.

Brenda Wallace, Manager of Environmental Services with the City of Saskatoon outlined several measures the City of Saskatoon is taking to reduce greenhouse gas emissions. She pointed to Saskatoon's residential recycling program rolled out in January 2013. **For every tonne of garbage recycled, 2.8 tonnes of carbon dioxide is saved. The City has also upgraded the energy efficiency of many city-owned buildings, achieving substantial reductions in utility charges.** The City also works to preserve its tree canopy which soaks up greenhouse gas emissions equivalent to 3,400 vehicles.

Two City pools are heated by solar thermal energy in Saskatchewan's largest solar hot water installation.

Photo credit: City of Saskatoon

SLIDE PRESENTED TO THE HEARINGS BY BRENDA WALLACE

Two of Saskatoon's swimming pools now get much of their hot water from solar panels. There are 90 solar panels at Lawson and 72 at the Harry Bailey pool. Pleasant Hill Village is also home to a solar panel array, with excess electricity being sold to Saskatoon's utility, Saskatoon Light and Power.

Brenda explained that when development of the new Evergreen neighborhood got underway northeast of Saskatoon's Forestry Farm, LED street lighting was installed throughout the neighborhood**. LED lighting has now become standard in new Saskatoon subdivisions.**

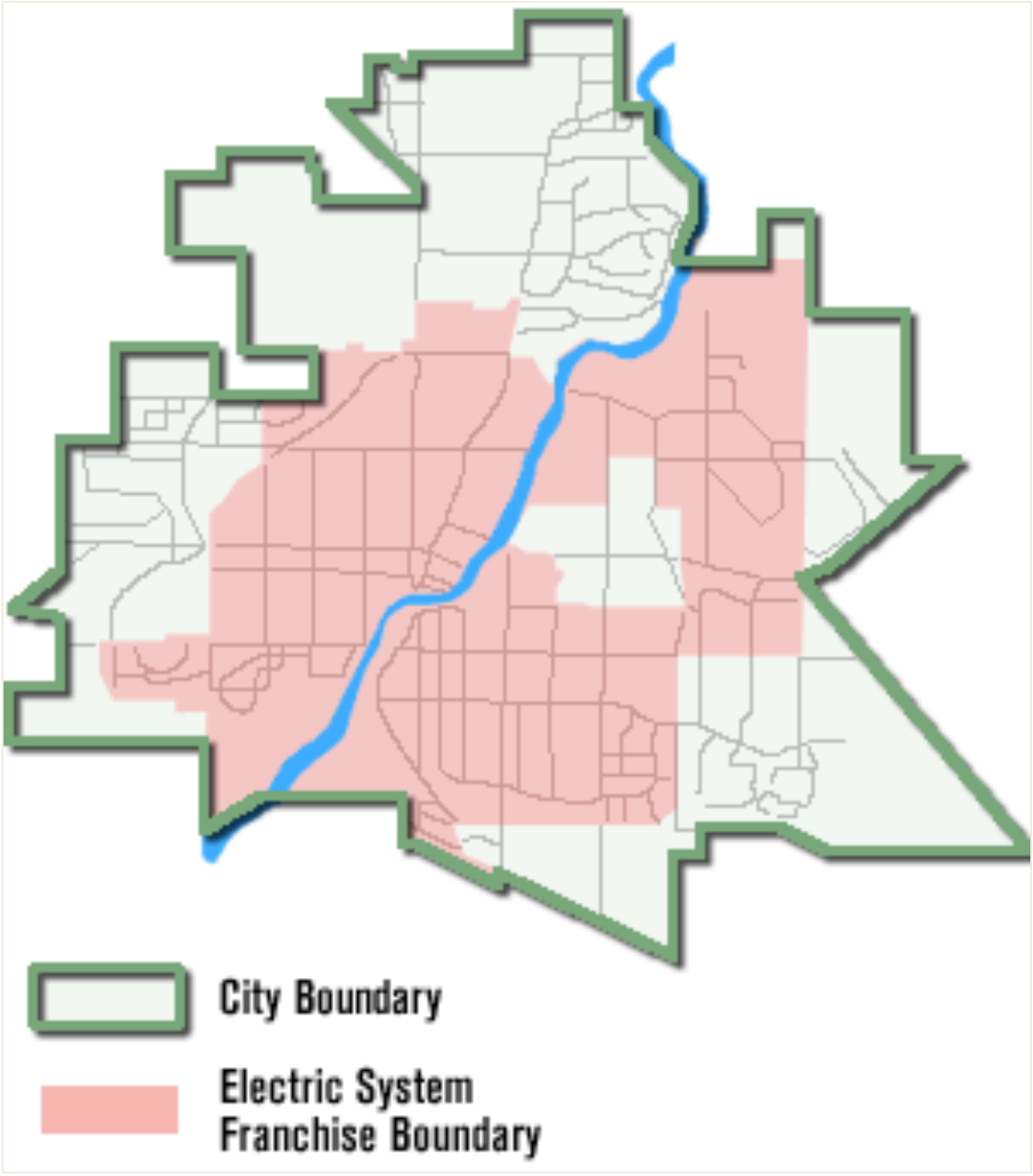
These examples illustrate that the City of Saskatoon is clearly making progress in reducing greenhouse gas emissions released from facilities it has direct ownership or control over.

Saskatoon has installed LED traffic lights and is increasing the number of LED street lights in neighbourhoods such as Evergreen. This has led to significant cost and energy reductions.

Photo credit: Kingsun

SLIDE PRESENTED TO THE HEARINGS BY BRENDA WALLACE

Saskatoon Light and Power also made a presentation to the Citizens' Hearings. It is one of two city-owned utilities in Saskatchewan, and currently purchases almost all of its electricity from SaskPower. Saskatoon Light and Power serves 60,000 customers, 90% of whom are residential. It also provides electricity for 21,000 street lights. Peak demand for electricity within its boundaries is 225 MW. The city utility generates annual revenue of $130 million and provides a return on investment of $23 million per year.



SLIDE PRESENTED TO THE HEARINGS BY KEVIN HUDSON

Kevin Hudson, Manager of Metering and Sustainable Electricity with **Saskatoon Light and Power**, reported that one of the City of Saskatoon's goals under its Energy and Greenhouse Gas Management Plan is to achieve a "diverse and environmentally sustainable energy system". He reported that **25,000 smart meters have to date been deployed**, a move that will help customers better conserve electricity and water use. He also reported that as of November 2013, **19 customer-owned solar PV systems have interconnected** with Saskatoon Light and Power generating a total of 125 kilowatts (KW).

Customer Distributed Generation

7 Kilowatt Solar Photovoltaic (PV) Installation (Community of North Park)

Solar Stained Glass (Cathedral of the Holy Family)

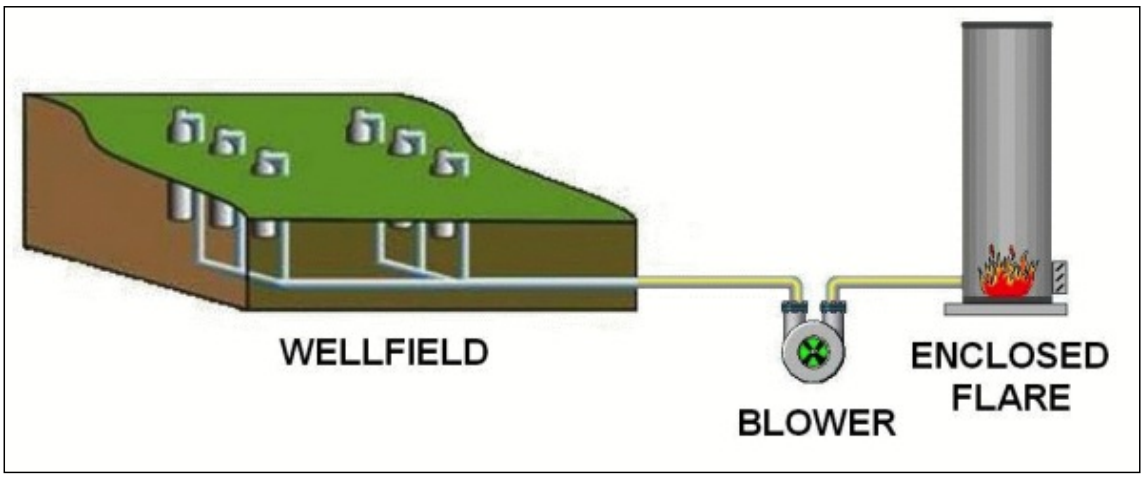
20 Kilowatt Ground-based Solar PV Installation (University of Saskatchewan)

SLIDE PRESENTED TO THE HEARINGS BY KEVIN HUDSON

Kevin shared details of the utility's new landfill gas collection project, which he has been closely involved with. The project will collect methane from the Saskatoon landfill, and utilize it for electricity generation. By doing so, it will sharply reduce the amount of methane that makes its way from the landfill into the atmosphere.

Saskatoon's landfill has over 5 million tonnes of waste in place, with over 300,000 tonnes added annually. Methane constitutes 50% of landfill gas composition. To date (November 2013) 12 hectares of the landfill have been covered with 18 inches of compacted clay. 29 vertical wells have been installed in the waste, together with 13,800 feet of underground piping. A 200 HP vacuum compressor has been acquired and will be used to suck up the methane. The methane will then be used in engine-generators or flared. **Once operational, the landfill gas project is expected to reduce annual greenhouse gas emissions into the atmosphere by 45,000 tonnes (carbon dioxide equivalent).**

Landfill Gas Collection Project



Annual GHG Reduction:

CO_2 equivalent:	45,000 tonnes
Like removing:	9,000 vehicles from our roads

Typical Landfill Gas Composition:

Methane	50%
Carbon Dioxide	40-50%
Nitrogen	0-10%
Oxygen	0-1%
Energy Value	~ 18 MJ/m^3 (500 Btu/ft^3)

SLIDE PRESENTED TO THE HEARINGS BY KEVIN HUDSON

Richard Huziak of the Saskatchewan Light Pollution Abatement Committee demonstrated how **Saskatoon could build on progress already made in city-owned facilities by reducing light pollution on a city-wide basis**. Light pollution, Richard noted, is "conservable waste". It is light shining where it is not needed, or light that is simply too bright.

Based on the analytical work done in other cities, Richard estimated the cost of light pollution in Saskatoon at $500,000 per year. This estimate is for "wasted light", and does not include the additional savings that would come with installation of more energy efficient lighting. Eliminating light pollution is thus an excellent way of cutting greenhouse gas emissions, especially when the power source for that lighting is fossil fuels.

Richard Huziak gave helpful examples of our tendency to waste light. He pointed out that over-lighting and the associated wastage of electricity is often associated with name-branding. Much light is also wasted through improperly designed lighting, and through what is referred to as 'up-lighting' – light that shines up into the sky well beyond the actual sign, often for advertising purposes. Finally, light is frequently wasted through unnecessary lighting – lights that are on even at times when a facility is no longer in use.

Richard Huziak pointed to the 'dark sky preserve' policies of Cypress Hills and of Grasslands National Park as examples of good public policy. He also credited the City of Saskatoon with an improved lighting policy for street lights and city-owned buildings, but noted the policy now needs to be extended to privately owned homes and businesses across Saskatoon.

Richard observed that **the use of light in North America is currently growing at double the rate of population growth.** He suggested **it is time to legislate against over-lighting and unnecessary lighting, and to introduce a strong lighting protocol into the National Energy Code for Buildings.** Lights should be erected only when and where they are needed, should be directed only where they are needed, should be turned off when not being used (on timers, switches, and motion detectors), and should be integrated with other lighting, rather than competing with it.

Louise Jones noted that Raymond Moriyama, the author of the 100 year plan that laid the foundation for the Meewasin Valley Authority, urged the design and development of an environmentally sustainable neighbourhood in Saskatoon. Louise pointed to the Swale in northeast Saskatoon as an excellent setting in which to model environmentally sustainable practices as a new northeast neighbourhood is developed.

NORTHEAST SWALE – PHOTO CREDITS DAFT
SLIDE PRESENTED AT THE HEARINGS BY LOUISE JONES

NORTHEAST SWALE – PHOTO CREDITS MVA
SLIDE PRESENTED AT THE HEARINGS BY LOUISE JONES

The portions of the Northeast Swale that lie within Saskatoon city boundaries are part of a 26 km long corridor that ties together parcels of natural habitat ranging from native prairie uplands to valuable wetlands. Louise explained that **the Swale holds at least 150 plant species, including some provincially rare ones and at least 75 bird species including 9 federally rare ones.**

Louise Jones emphasized the importance of natural areas as absorbers of greenhouse gases, and the important role that wetlands can play in reducing flooding from intense rainfall events, one of the direct impacts of climate change that is already being experienced. She noted that both the City of Saskatoon and the Meewasin Valley Authority are taking important steps to conserve parts of the Swale that lie within City boundaries. Unfortunately, there is no formal plan to protect parts of the Swale that lie within Corman Park RM and Aberdeen RM jurisdictions. In fact, the Saskatchewan Department of Highways is planning to put a proposed Perimeter Highway right through one of the major waterways.

Louise Jones expressed concern about the City of Saskatoon's plans for new road and bridge infrastructure to support city growth in northeast Saskatoon. She said that the City should prioritize reducing greenhouse gases created by motor vehicle transportation, and find other ways to move commuters that are far less polluting.

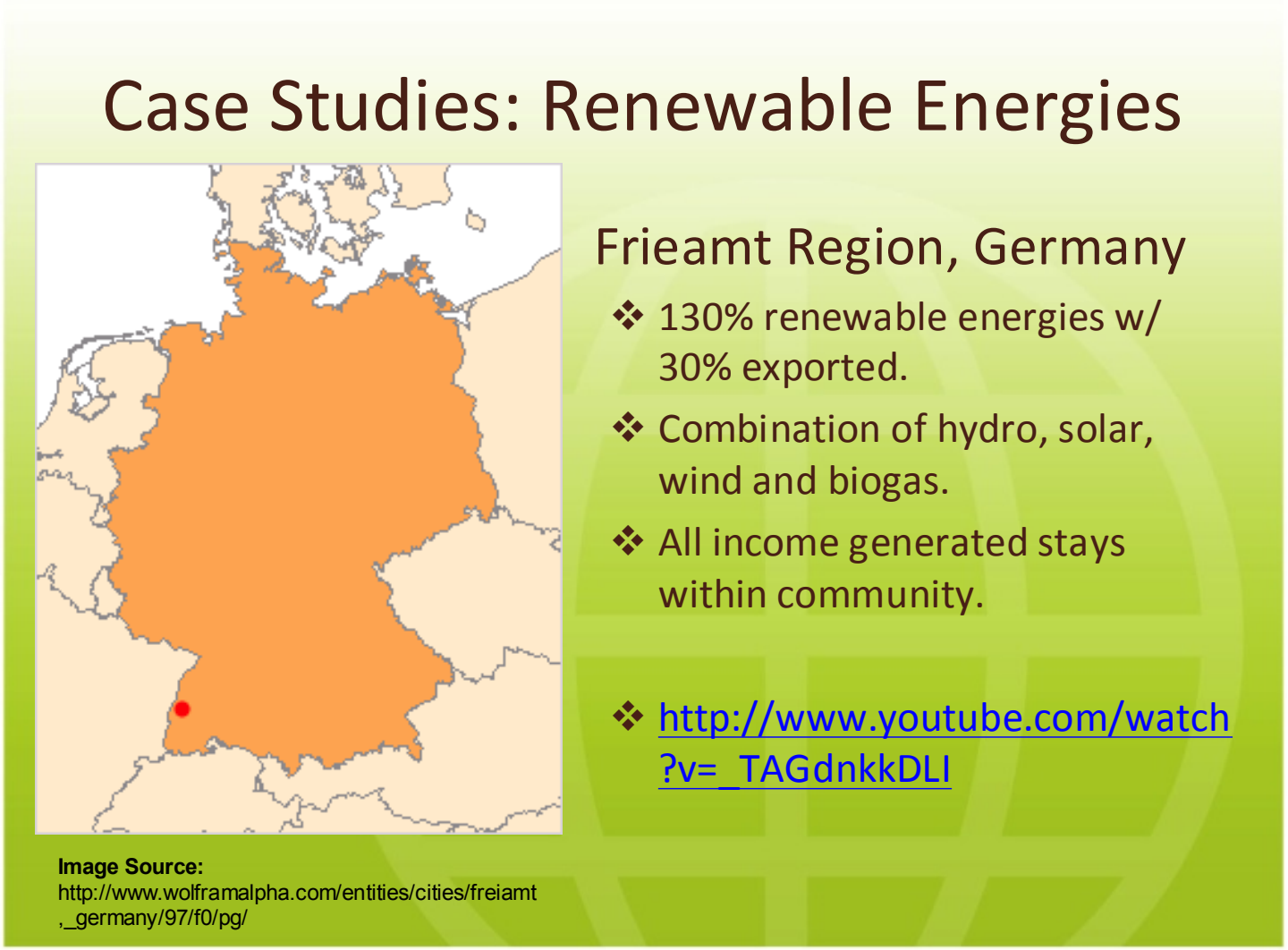
She urged the City to adopt measures that will reduce lighting in new northeast neighbourhoods and make the Swale area a nocturnal preserve. Keeping northeast Swale neighbourhoods herbicide and pesticide free will also be important to their preservation. Bicycle trails should be developed that will encourage cycling

in these neighbourhoods, and allow residents easy reach to the riverbank and the downtown for work or pleasure.

James Glennie spoke to the benefits that come to local communities around the world that develop **community-owned renewable energy systems**, particularly community wind projects. Such projects allow communities to reduce their greenhouse gas footprint, and **because the projects are locally owned, they ensure that much of the money spent by residents on electricity services stays in the local community.**

Given the increasingly attractive economics of wind power, and the absence of a wind farm in the Saskatoon region, James Glennie's organization, Saskatoon Community Wind, has proposed the development of a 20 megawatt community-owned wind farm within 30 kilometres of Saskatoon that would sell electricity at a competitive price to Saskatoon Light and Power. Such a project could supply the Saskatoon utility with about 5% of its electricity consumption in a virtually carbon-free manner.

Rick Morrell expanded on the viability of this approach by pointing to communities in Germany that are providing all their electricity from renewable energy. For example, the Frieamt area of Germany produces renewable electricity from a wide array of sources, including wind, and exports the surplus.



SLIDE PRESENTED AT THE HEARINGS BY RICK MORRELL

Rick Morrell also pointed to Vauban, a German neighbourhood in the city of Freiburg, which practices environmental sustainability in a wide variety of ways, including achieving a low carbon footprint. Vauban has developed solar hot water and solar photovoltaic systems on many of its buildings, uses its sewage to produce biogas for electricity generation, provides its citizens with high quality public transport, and has adopted street designs that favour walking and cycling over driving.

SLIDE PRESENTED AT THE HEARINGS BY RICK MORRELL

Peter Prebble suggested to the hearings that both Saskatoon and Regina should consider establishing a more formal relationship with the City of Freiburg (population 220,000), and integrating many of its environmental sustainability practices into planning for new neighbourhoods. In addition to measures mentioned above, Freiburg City Council has set energy efficiency standards for new house and commercial construction that significantly exceed national standards, and is very active in encouraging the building of super-energy efficient homes. Freiburg has successfully built up a vibrant 'green economy' employing over 10,000 people in 1,500 businesses. Over 1,000 people are employed in the solar technology industry alone.

SLIDE PRESENTED AT THE HEARINGS BY RICK MORRELL

13. Ecological Justice

Several presenters touched on other important environmental issues that are interconnected to climate change, and offered insight into the change of attitude toward the Earth that will be needed in order to properly confront climate change and achieve environmental sustainability.

Janelle Pewapsconias focused her presentation on indigenous water rights. Her home is Little Pine First Nation (Minahikosis), a 5 mile by 5 mile reserve through which the Battle River flows.

Little Pine First Nation is very concerned with the poor quality of water in the Battle River, and the river's poor riparian health. The Battle River suffers from low oxygen levels, low fish populations, eroding and slumping banks and high nutrient levels. Seventy miles upstream from Little Pine First Nation, in Alberta, the Battle River is used for domestic, industrial and agricultural purposes. It receives runoff laden with pesticides, herbicides, fertilizers and other pollutants which impact upon wildlife, habitat and water quality.

Janelle Pewapsconias explained that Wāhkōhtōhwin is the innate relationship that connects humans to the Earth. To protect the water - based on Indigenous Water Rights - for present and future use, it is imperative to

understand that Little Pine's relationship to water is firstly derived from wāhkōhtōhwin, Nehiyaw (Cree) worldview and tradition. Little Pine First Nation's belief system stems from the worldview that all living things are interconnected and human spirits are the most pitiful and dependent beings on Mother Earth. In her testimony before the Hearings Janelle said: "We believe that Creator made humans to be fashioned like Mother Earth; like the blood in our bodies, our water sustains life on the planet. Water has a spirit, water is alive, and water is the epitome of interconnectedness. Natural laws are the rules or life guidelines that we believe to be in existence since time immemorial for human beings to follow. It is these practices that led us to thrive sustainably, by not taking more than necessary, giving gratitude, and taking responsibility for life's continuation on our Mother Earth."

Building on her comments on constitutional rights and sovereignty (see earlier section) Janelle's focus is to use inherent rights and treaty rights to protect the spirit of the water in the Battle River, and to advance Little Pine First Nation's "right to sovereignty". To live water sovereignty, Janelle said, Little Pine must "walk with two eyes open, meaning we must utilize the best of western science and knowledge, but walk with the worldviews, wisdom and values of our ancestors first."

She stated that inherently there are two main types of rights in regard to water that will need to be exercised: the right to manage the waters and lands (even beyond the borders of Little Pine First Nation), and the right to engage in Environmental Protection, which can include policing, policies, implementation of economic tools, and planning. To become a self-determining nation in terms of water, Little Pine will need to indicate sovereignty through letter or declaration.

The western world view has led to "market failure of water quality in Little Pine First Nation", Janelle Pewapsconias stated. "Policy could regulate agriculture, industry and domestic watercourse use, which would influence (reduce) the amount of pollutants entering the river and amount of water usage, and alter the outcomes downstream."

Although Little Pine now has a reverse osmosis system, which has at least improved drinking water quality, it is a short term solution. Long term sustainability calls for "eliminating the water market, allocating water resources sustainably, giving gratitude to the life that sustains the people, and creating policy and practices that achieve self-determination of our Nation", Janelle concluded.

Brian Grandbois reflected on the history of the Primrose Air Weapons Range located in northeast Alberta and northwest Saskatchewan, and reminded the hearings of how the Weapons Range was imposed upon First Nations and Métis people living in the area in the 1950's. The Dene community that Brian is part of was told by the federal government that it must move to make way for the Weapons Range. At first, the community was promised the move would be temporary; the Primrose Air Weapons Range was to be leased for 20 years. That was sixty years ago.

Dene residents moved to 3 different reserves in the Cold Lake area. Later, Dene children were taken away to residential schools, Brian said. As time went on, a self-reliant people began to suffer many social ills. Brian recalled when members of NATO started bombing. In the 1980's the Cruise missile was perfected using the Primrose Air Weapons Range. Mkore recently, Brian noted, cluster bombs used in the Middle East were tested "on the grave sites of my people".

Max Morin presented to the Citizen Hearings on behalf of the Committee for Future Generations. He spoke to the critical importance of water to life on Earth, and the multiple threats posed to water quality in Northern Saskatchewan by uranium mining, Alberta oil sands pollution, and a possible high-level nuclear waste disposal project in northern Saskatchewan.

He told the Commissioners that the Committee for Future Generations has given special priority to the issue of high level nuclear waste disposal. Max recalled the Walk from Pinehouse to Regina in 2011, which the Committee for Future Generations organized in order to mobilize opposition to a proposal for high level radioactive waste disposal in the Pinehouse region. The Walk proved to be a successful way to increase public awareness of the long term threat posed by nuclear waste. Max Morin is deeply concerned that if a high level nuclear waste disposal project in Saskatchewan's north was allowed to proceed, the buried radioactive waste could ultimately contaminate ground water.

Max Morin also expressed concern about the risks to ground water associated with uranium mine and mill tailings in Northern Saskatchewan. Several northern uranium mine sites each have millions of tonnes of radioactive tailings stored on-site, and over time these long-lived wastes could leak out of the tailings management facilities in which they have been deposited, and contaminate surface or ground water.

Finally, Max Morin drew attention to the negative environmental impacts of the oils sands industry based in northeast Alberta. He reported that elders in northwest Saskatchewan are beginning to see early signs of acid rain pollution released by oil sands operations. He also drew the attention of the Hearings to the toxic tailings pond legacy the oil sands industry has left behind.

David Henry, a board member with the Saskatchewan Environmental Society, also spoke to how very polluting the oil sands industry is. For example, just one plant, Suncor Energy, in one year puts out roughly 30,000 tonnes of VOC (volatile organic compounds), 22,000 tonnes of $S0_2$ (sulphur dioxide), 14,000 tonnes of particulate matter and 70,000 tonnes of GHGs (greenhouse gases).

David focused his testimony on the risks to Saskatchewan from the sulphur dioxide and oxides of nitrogen emissions from the oil sands industry. Within two weeks of being released into the atmosphere, these emissions turn into sulphuric or nitric acid, and have fallen to Earth as acid rain or acid snow. David noted that "together all of the Oil Sands operations in Alberta spew an estimated 160,000 tonnes of acid- producing pollution into the air each year". Because the predominant winds are from the west, much of this acid rain blows into Northern Saskatchewan.

It is well documented that long exposure to acid rain has many detrimental effects. Significant amounts of acid buildup can damage or destroy fish populations and their food chains, acidify soils, gradually kill forests, damage homes and infrastructure, and cause respiratory problems in humans.

David Henry emphasized that much of northern Saskatchewan and northern Canada shares a common geology: the Canadian Precambrian Shield. Scientists judge it to be the world's most sensitive landscape to the effects of acid rain. Its thin soils, granite bedrock, and lack of limestone in the soils mean that the Shield is quickly impacted by acid deposition.

The first signs of acid rain are beginning to appear around La Loche, 200 km downwind from the oil sands mines. David explained that a neutral solution has a pH of 7.0. Environment Canada classifies any precipitation under 5.0 as acid rain. Limited data show that rain and snow around La Loche has had a pH below 5.0 in several monthly readings. To prevent serious problems from occurring, David Henry stressed that all levels of government must adopt stricter emission standards for all oil sands mining and refining operations. Most importantly, our society needs to focus on reducing fossil fuel consumption.

Saskatchewan Citizens' Hearings on Climate Change

AGENDA for Day 1
November 1st, 2013

CLIMATE CHANGE
CITIZENS' HEARINGS

9:30 AM
Welcome and Introduction
9:40 AM
Peter Prebble "Existing and Predicted Impacts of Climate Change on SK & AB and Policy Recommendations"
10:00 AM
Angie Ortlepp "Alternative Energy Options for New and Existing Buildings"
10:30 AM
Jan Norris "Be the Change"
11:00 AM
Diego Steinaker "Mitigating Climate Change by Management of Rangelands"
11:30 AM
Karri Munn-Venn "Canadian Churches and Climate Justice"
12:00 PM
LUNCH
12:30 PM
Rick Morrell "Design of a post fossil fuel economy and elimination of key barriers to achieving it"
1:00 PM
Gail Mackay "Promoting Youths' Experience of Being in Relationship with the Land"
1:30 PM
Anthony Mackay, Jana Miller & Tyler Rittinger "A Personal Reflection on the Importance of Ecology Education"
2:00 PM
Dave Sauchyn "Drought in a Warming Climate: A Challenging Scenario for Saskatchewan"
2:30 PM
Michael Schwandt "Climate change and impacts on public health"
3:00 PM
Traci Braaten "Lifting the Veil – Changing Climates and the Indigenous Experience"
3:30 PM
SNACK BREAK AND NETWORKING
4:00 PM
Candace Savage "Growing Wild in the City"
4:30 PM
Robert Halliday "SaskPower: Challenges and Opportunities"
5:00 PM
Max Morin "Climate-related changes in Northern Saskatchewan"
Brian Grandbois "The Impacts of the Primrose Air Weapons Range on First Nations and Métis People"
5:30 PM
Brenda Wallace "Accepting the Challenge of Environmental Leadership"
6:00 PM
SUPPER
7:30 PM
KEYNOTE
Kathleen Dean Moore "It's Wrong to Wreck the World: Ethics and the Climate Crisis"
8:30 PM
KEYNOTE
Bob Sandford "Come Hell and High Water: Flood risk and resilience in a rapidly changing West"

Saskatchewan Citizens' Hearings on Climate Change

AGENDA for Day 2
November 2nd, 2013

CLIMATE CHANGE
CITIZENS' HEARINGS

9:30 AM
Welcome and Introduction
9:40 AM
Mark Bigland-Pritchard "Is there a way out of the climate crisis? - Thoughts on Policy Options"
10:00 AM
Rick Huziak "Addressing Climate Change though Responsible Outdoor Lighting Practices"
10:30 AM
Toddi Steelman "Climate Change & Saskatchewan"
11:00 AM
Chris Hrynkow "Earth Matters: Christianity, Ecojustice and Climate Change"
11:30 AM
David Henry "How Alberta's Oil Sands Will Affect Northern Saskatchewan"
12:00 PM
LUNCH
12:30 PM
Brent Veich "Using residential solar to reduce greenhouse gas emissions"
1:00 PM
Elaine Wheaton "Agriculture in a New Climate"
1:30 PM
Janelle Pewapsconias "Protecting the Spirit of the Water"
2:00 PM
Shane Wolffe "Future Proof your home to build a more Sustainable Society"
2:30 PM
Louise Jones "Sustainability, Climate Change and the Northeast Swale"
3:00 PM
SNACK BREAK AND NETWORKING
3:30 PM
Rose Richardson "The Winds of Change"
4:00 PM
Kevin Hudson "Achieving a Diverse and Environmentally Sustainable Energy System for the City of Saskatoon"
4:30 PM
James Glennie "Saskatoon Community Wind: A real option for community action to address climate change"
5:00 PM
Su Deranger and Wendy Lerat "Recognizing Indigenous Voice in Climate Change"
5:30 PM
Naveed Khaliq "Climate Downscaling over the Canadian Prairie Provinces: An assessment of Future Changes to Seasonal and Extreme Precipitation Characteristic"
6:00 PM
SUPPER
7:30 PM
KEYNOTE
Kirsten Zickfeld "Climate Change in Canada: Why we must care"
8:30 PM
KEYNOTE
Christian Holz "And the Moral of the Story … – Moral Aspects of Climate Change"

Supporting Organizations

Climate Justice Saskatoon

Green Energy Project Saskatchewan

Saskatchewan econetwork

Saskatchewan Environmental Society

National Farmers Union