

Climate Adaptation Risks and Consequences for Alberta Business

Bob Page, PhD

TransAlta Professor of Environmental Management and
Sustainability
ISEEE, University of Calgary



Calgary Chamber of Commerce
Haskayne School of Business, University of Calgary
November 28, 2008

Introduction

- Climate Change requires **two types** of business response:
 1. **Mitigation** – cut emissions, capture carbon, or change technology.
 2. **Adaptation** – in response to climate, business is forced to change its practices.

- The first has received most of the **government** attention – but the second may prove more important to some **businesses**.

- **Here in Alberta** huge risks in oil and gas, electricity, mining, forestry fisheries, and agriculture.

What is adaptation?

- The **scientific definition** from IPCC is:

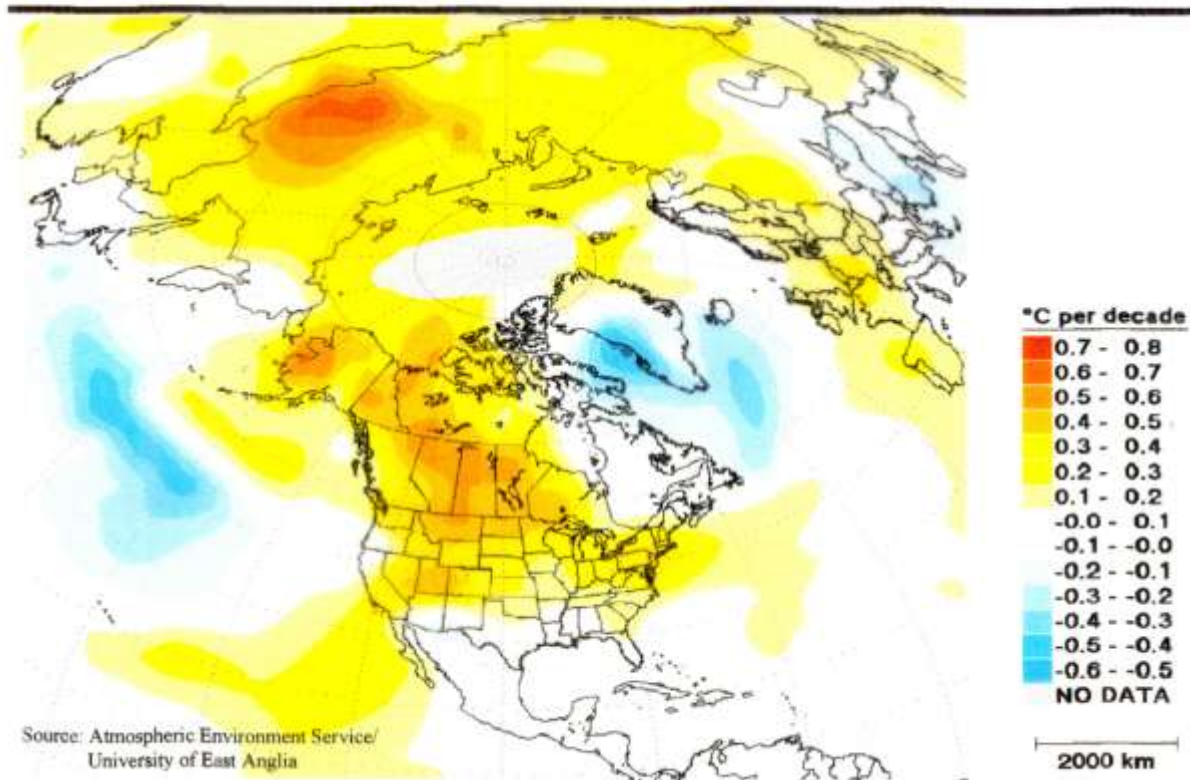
“adjustment in **natural or human systems** in response to actual or expected climate stimuli or their effect which moderates harm or exploits beneficial opportunities.”

IPCC Third Assessment Report – Working Group II

- Or to put it more simply how do Governments, Municipalities, Business, Nature, and Citizens make changes to cope with new climate conditions?
- We have to **define existing trends**, estimate future impacts from climate models and scenarios and develop a strategy to limit the impacts and make change manageable.
- We build from **historic records** of climate trends (Palliser across the Prairies in 1850's) contemporary trends of the last 3 decades, and future projections.

Surface Air Temperature Increases

Annual Surface Air Temperature Trends 1961-1990



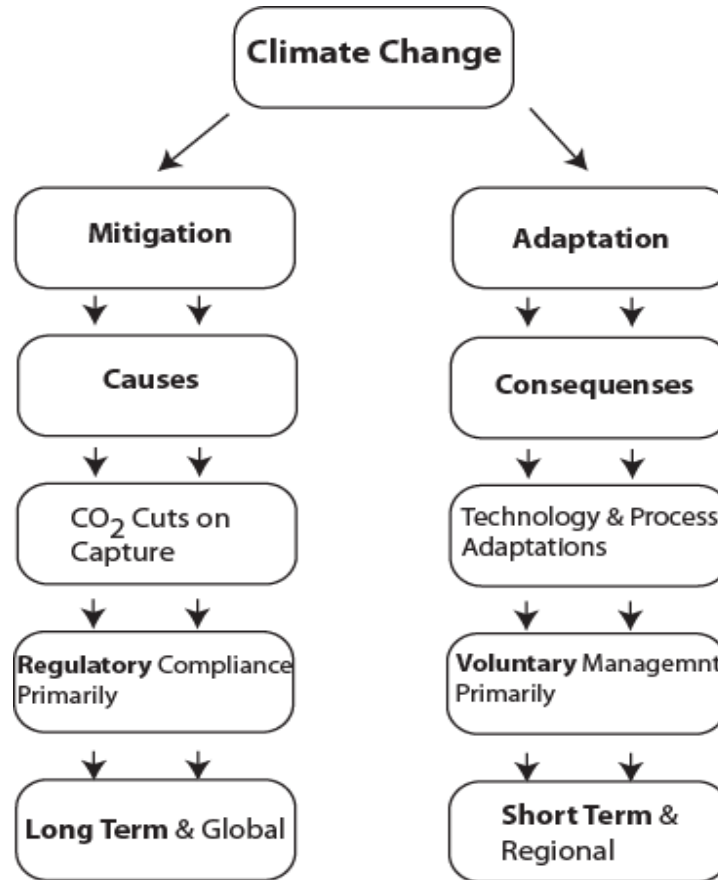
What is Adaptation? (cont)

- In attempting to define our level of **vulnerability** to climate change impacts we face enormous uncertainty – **rate and intensity of change** – but now a very high probability of change and economic risk.
- What are the **parameters of the risk**?
 - A. A global change of 1°C to 2100 – modest level of change similar to today – net benefits to N. Alberta.
 - B. A global climate change of 5°C to 2100 – destabilizing of climate with unmanageable consequences for the economy and society.
- We will probably end up somewhere in the middle.
- By the time we know for sure, it may be too late to take adaptive measures to protect the Alberta economy and society.

What is Adaptation? (cont)

- **Low income** and rural Albertans including First Nations will face some of the greatest challenges.
- Many **species will decline** as their habitat changes.
- As past history shows, climate is not steady and gradual, but comes in **sudden surges** which compounds the problem of coping.
- Our history shows the **economic and social consequences** – during the dust bowl year of the 1920's and 30's – the Alberta economy was devastated – wind blown soil erosion and drought, and family farms abandoned

Separating Mitigation and Adaptation Processes



□ Both are essential but very different types of policy challenges for Alberta business.

Time Lag and the Delayed Atmospheric Response

- ❑ The CO₂ warming effect is in the atmosphere for up to a century – CO₂ from World War I is still not gone completely.
- ❑ Hence if we cut emissions today, there is this time lag of about a century before all the benefits take effect.
- ❑ Cumulative impacts globally will continue with the large expansion of emissions from the developing world. (China etc.)
- ❑ The climate impacts will be felt disproportionately with the greatest impacts towards the poles. (Canada and Russia)
- ❑ In Canada the greatest impacts will be found on the Western prairies (water) and the western arctic. (permafrost & sea ice)
- ❑ We will be leaders in experiencing climate change so we must be leaders in adaptation.

Vulnerability, Capacity, & Exposure

- When we **assess vulnerability** we must begin with the assessment of exposure which has several elements.
- We begin first with estimating the **range of potential impacts** for a given factor in climate change. (temperature increase or precipitation decrease)
- We then must estimate the **potential resilience** of the existing natural capital as well as economic and social infrastructure.
 1. What requires **no adaptive** action?
 2. What can adjust to the new conditions with **minor challenge**? (new air conditioning)
 3. What requires **major adjustment** to survive? (crops impossible without new irrigation)
- What is the **resiliency** in the economy to new conditions?

Components in Adaptation for Business

- ❑ This is now an added component in **Enterprise Risk Management (ERM)**, already incorporated by some companies.

- ❑ Potential areas for vulnerability include
 - Decline in water availability. (**power plant** cooling)
 - Increase in winter temperatures. (northern **winter roads**)
 - Increase in summer heat. (need for **refrigeration**)
 - Extreme weather and property damage. (**EMS Services**)
 - Extreme weather and property damage. (**insurance cots**)
 - Forest fires hurt **mountain tourism**.
 - Forest fires hurt **forest products**.
 - Bow river flow rates decline hurt **Calgary economic expansion**.
 - Water costs curb **agriculture irrigation**.
 - **Oilsands** forced to adopt 100% water recycling.
 - Seasonal warming changes the pattern of **electricity consumption**.

Business Adaptation (cont)

- ❑ Water costs come to equal energy costs in operations
- ❑ Water location becomes a key factor in plant location.
- ❑ The insurance industry is developing a whole new portfolio of products to handle climate risks.
- ❑ Power Plants (nuclear, coal, gas) may have to use more expensive air cooling than water. (Bruce Nuclear) – or transmission costs from remote areas.
- ❑ CO₂ will replace water for EOR in oil production from mature oilfields.
- ❑ Increased summer heat will require companies to use more energy for refrigeration and cooling.

Business Adaptation (cont)

- ❑ Winter tourism hurt by greater variance in snow conditions.
- ❑ Forest industries face more insect invasion like the mountain pine beetle.
- ❑ More companies forced to pay increased insurance or face climate risks excluded from coverage.
- ❑ Investors will demand full disclosure of climate risks – not just mitigation costs.
- ❑ Hedging of climate change risks through weather futures or catastrophe bond.

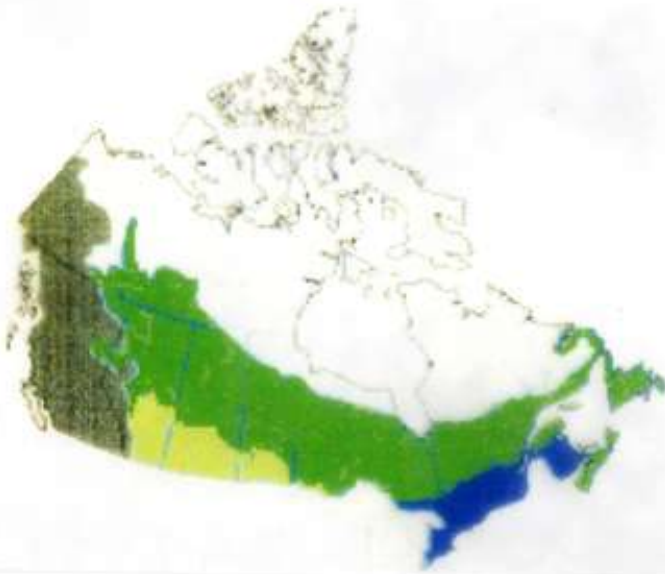
Tools for Business Response

- ❑ There are a variety of site specific climate data sets, analytical capacity, and methodology for corporate planning.
- ❑ Every company focusing adaptation risks needs some climate modeling and analytical capacity to manage and quantify the complex risks.
- ❑ We need site specific climate projections for regulatory approvals of projects under CEIA process. Data is too imprecise today. (available data is far less then the legal expectations)
- ❑ Converting climate risk data into hard dollar estimates still impossible. May never be realistic!
- ❑ Improved emergency response teams to deal with extreme weather. (like oil spill teams)

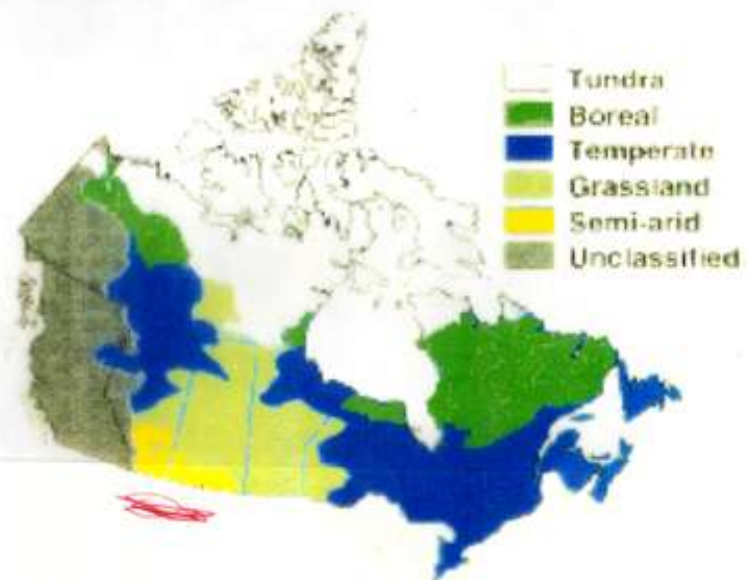
Forests Move North

Changes in Forest and Grassland Boundaries

Present Day

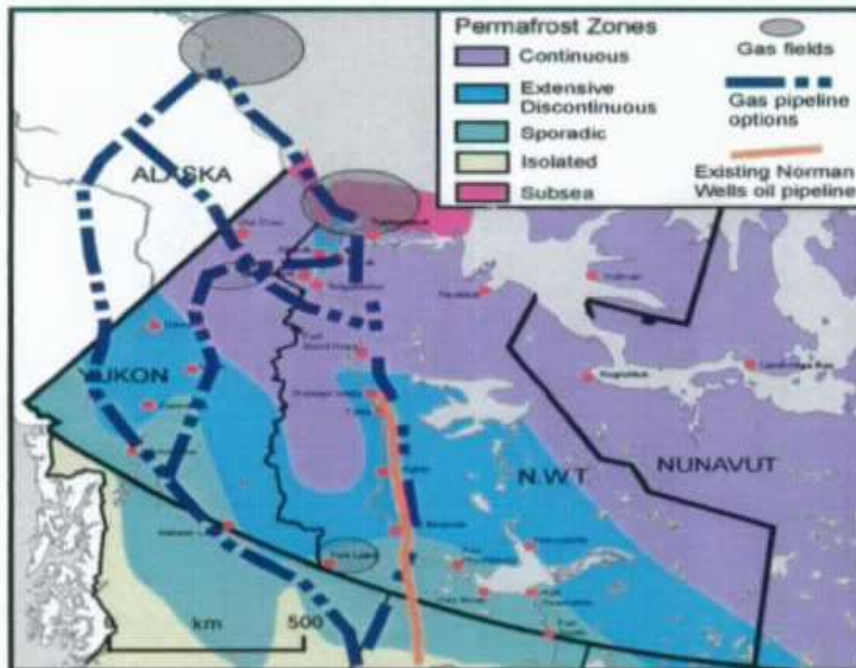


Doubled-CO₂



Arctic Pipelines

Adapting northern gas pipelines



- all possible routes cross extensive permafrost areas
- climate changes are increasing depth of annual thaw and decreasing slope stability
- climate change impacts will need to be considered in the design, building and maintenance of all pipelines



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Risk Assessment and Corporate Planning

- ❑ Some sectors and some locations will have heavy risks while others will be far less vulnerable. (refinery on the Gulf Coast higher risk than Strathcona)
- ❑ Due to the uncertainties on timing and the intensity of impacts, this will be an uncertain ERS for sometime.
- ❑ Companies will have to monitor conditions closely and apply adaptive management procedures.
- ❑ Technical design will require over building capability to cover some potential risks.

Climate Impacts Beyond Alberta

- Climate Change beyond Alberta will impact Alberta business strategies.
 1. We have an integrated continental energy system from Alberta to the Gulf Coast – weather disruptions in one area effect the whole system. - Katrina
 2. Forestry diseases promoted by climate warming are no respecter of provincial boundaries. – prevailing winds.
 3. The opening of the Arctic Ocean with the sea ice disappearance will bring Siberian oil and gas into North American markets.
 4. Every business challenge is a business opportunity.

Conclusions

- A. We must raise the awareness of climate change adaptation in government and business so leaders are aware of the potential vulnerabilities and cost effective options for solutions.
- B. Arctic and Western Prairie Canada will experience rapid change, one of the most rapid on the Globe. In turn we will have to develop means of adaptation before most others.
- C. Water will become scarcer, more costly, and a regulated commodity – water pricing, water rights trading, and possible water allocation.
- D. Through government and the universities we must develop much better data and modeling to inform business decision making.
- E. We must develop new adaptive management methods to reflect the latest climate related data.