

Global Climate Change

Where Are We Headed?

**Draft Speaking Notes
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What is Global Climate Change?

Slide One

- The "greenhouse effect" is gases trapping heat in the atmosphere that would otherwise escape to space. These greenhouse gases include carbon dioxide, methane, nitrous oxide and water vapour.

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- Some of this effect is natural and necessary. Carbon dioxide is naturally released by animals and decaying plants. It is naturally absorbed by growing plants. There is a balance between the amount of carbon dioxide and other greenhouse gases released into the atmosphere and the amount absorbed by

growing trees.

- However, since the industrial revolution human activity has upset this balance. Two activities: Burning of fossil fuels, deforestation are primarily responsible for have increased emissions of carbon dioxide into the atmosphere.
- Other activities have also upset the balance. Cows and other livestock produce 76 million tonnes of methane a year. Methane from rice production produces about 100 million tonnes of methane. Artificial fertilizers produce about one and a half million tonnes of nitrous oxides. Rotting garbage in landfills produce about 30 million tonnes of methane.
- These gases have lifetimes in the atmosphere of up to 200 years (CO₂) and their concentrations in the atmosphere have been building up since the industrial revolution began. The problem is not the emissions in any particular year, but the built up pool of gases in atmosphere over decades.
- Since pre-industrial times the concentration of carbon dioxide in the atmosphere has grown by 30%; the concentration of methane has grown by 145%.
- The result of the build up is an enhanced greenhouse effect and global climate change. The results of these changes are predicted by scientists to include significant warming, increases in extreme weather such as flooding and droughts, rises in sea level changes, loss of biodiversity. These in turn could lead to incredible stresses on our social systems caused by waves of eco-refugees, propelled by floods and disrupted food production.
- The extent to which these predictions occur will depend on what action is taken.

Climate Change is Happening - Slide 2

- After years of debate there is general scientific consensus that Climate Change is happening now and appears to be caused by human activity.
- During the last century global mean temperatures have increased between 0.3° and 0.6° C. "It is unlikely this is due entirely to natural causes".
- In some regions there is clear evidence of increased extremes of weather events such as hurricanes and floods. It is not possible to attribute one particular heat wave, storm or other unusual event with global

warming, but increasing patterns of abnormalities are consistent with warming.

There are two aspects of the causes and science of global warming that make it particularly challenging to deal with:

A. It is mainly caused by burning fossil fuels and our economy is highly dependent on fossil fuels for energy.

B. Just to stop global warming from getting worse we need to decrease emissions by over half.

Challenge A: the Tight Link to Fossil Fuel Use and Economic Activity.

What makes global climate change a unique problem is the extent to which the source of the problem is woven into the fabric of the world economy. The problem is

1. that carbon dioxide -- the predominant greenhouse gas -- is an inevitable byproduct of burning fossil fuels.

- If you burn gasoline you will create carbon dioxide. Carbon dioxide can not be realistically removed from exhaust because it is the largest portion of exhaust. This is different from most pollution which can be dealt with by relatively minor changes that remove some minor component of emissions. For instance, acid rain can be reduced by using low sulphur coal or using electrostatic scrubbers to remove sulphur from smoke stack fumes.

Slide 2.5

2. Since the industrial revolution energy use and economic development have tended to go together hand in hand, and fossil fuels have been the main source of energy.

- Although there are many ways of reducing greenhouse gas emissions at no cost to the economy, energy use, mainly from fossil fuels has historically been tied to economic activity. Historians look to tonnes of coal burned and barrels of oil consumed as indicators of economic strength. Ups and downs in GNP continue to be closely linked to CO₂ emissions (e.g. early 1990's Canadian emissions declined during recession).

Result of this is that reducing emissions of greenhouse gases requires changes throughout the economy. There are no easy "technological fixes". There are no end of pipe solutions.

Slide 2

Challenge B: the Need for Significant Emission Reductions to Avoid further harm.

- For many pollution problems a reduction in emissions leads to an improvement in the environment, e.g. reduced nitrous oxide and fine particulate emissions there will immediately be less smog than prior to the reduction. This is not true for global climate change.
- To stop concentrations of greenhouse gases from increasing, emissions must be reduced to a level equal to levels that can be absorbed naturally by nature. The situation is analogous to an obese person who is eating 10,000 calories a day and only burning 4,000. Reducing consumption to 9,000 calories a day will not reduce weight.
- According to a consensus of the world's leading scientists a 60% reduction in emissions from 1990 levels would be required to stabilize concentrations in the atmosphere.
- If we just stabilize emission levels global climate change will get worse. Atmospheric concentrations of carbon dioxide would continue to for at least two centuries. They would double pre industrial revolution levels by 2100.

What are the Current Trends? Slide 3

- In fact we are not even succeeding in even stabilizing our emissions.
- Many industrialized countries including Canada have committed to stabilizing emissions at 1990 levels. Unfortunately almost all industrialized countries will fail to meet their commitment.
- Canada has an "Action Plan" to reduce greenhouse gases. Unfortunately, there is little chance the action plan will succeed. It generally relies on good will of industry, asking industry to do its best.
- Sheilla Copps has admitted the Action Plan won't stop emissions from growing. Total greenhouse gas emissions in Canada are projected to be 13% above 1990 levels by 2000, and 19% above by 2005. B.C.'s emission levels have climbed almost 9% from 1990 to 1994. Returning to the obese person analogy, we are not only failing to reduce are calories, we are eating more than ever.
- Worldwide, unless governments take strong action it expected that emissions will continue to grow. Projections of future economic and population growth are difficult. However, the most likely scenario

is that atmospheric concentrations of carbon dioxide will double from pre-industrial levels sometime around 2050. This can be avoided if action is taken by governments.

What will these increases mean: Slide 4

There is considerable uncertainty as to what increased greenhouse gas concentrations will mean. The IPCC expects increases in temperature of 1°C; to 3.5°C; C by 2100. The best estimate is 2.0°C; C.

A couple of things should be kept in mind when considering these numbers:

- This rate of change is greater than seen in the last 10,000 years.
- The increases would not be equal everywhere.

If nothing is done to decrease emissions the following are the predicted consequences in 2100. **Slide 5**

- Decreased food production in tropical countries. This is already where world's poorest people live and where individuals are already at greater risk of starvation.
- Increases in diseases such as malaria, yellow fever and river blindness are projected. There is already evidence that malaria and yellow fever are spreading geographically.
- Because of melting polar ice and rising sea levels, flooding is expected in heavily settled areas such as Bangladesh.
- These impacts will be felt in North American. Massive stresses on the population of the worlds poorer countries will lead to eco-refugees and corresponding stresses on social and political systems of North America and Europe.
- Changes in forest types and loss of forest species are predicted. Forests will have difficulty adapting to changes in temperatures and some species will simply disappear.
- Increasing forest disease could compound the global warming.
- Global sea level changes of 0.3 to 1.0 metres are expected by 2100. These increases could be three times as high in some regions.
- The result could be loss of some island ecosystems, loss of wetlands and loss of beaches.
- More heavy rainstorms in some areas and droughts in others. Because of less snow pack water shortages can be expected.
- Loss of fisheries. Changes in ocean circulation and changing sea temperature could severely impacting

on fish.

- (Speculation that fall in B.C. fisheries may be result of increased temperatures.)

Change beyond 2100 Slide 6

- If no action is taken, the 1 to 3.5°C increase in temperature by 2100 will not stop there. Even if concentrations are stabilized by 2100, temperatures will continue to rise. It is possible that the 1 to 3.5°C temperature rise by 2100 will be repeated in the next 20 to 50 years.
- This assumes concentrations will be stabilized by 2100.
- If concentrations continue to grow, even slowly, by 2250 atmospheric concentrations of CO₂, assuming a plateauing of population and very slow growth in emissions, temperature increases of around 10°C and possibly as high as 18°C are forecast.
- Massive losses of land, forests, species, beaches and human lives would result.

Potential for Positive Feedback

- The forecasts referred to are for based on gently rising concentrations of greenhouse gases in the atmosphere.
- Scientists also recognize that there is a chance of unpleasant surprises caused by "positive feedback". In other words there is a risk that global warming can lead to further increases in greenhouse gas emissions and further global warming.
- For instance,
- carbon and methane chemically trapped could in deep ocean sediments could be de stabilized by increasing ocean temperatures.
- Methane trapped in permafrost could be released as permafrost thaws.
- The results would be even more catastrophic if positive feedback does occur.

Climate Change Can Be Curbed Through Cost Effective Policies Slide 7

So far the message I have been delivering is full of gloom and doom. Essentially : global warming is happening; we need huge decreases in emissions to stop warming; these decreases are not happening; if we do not stop the increasing concentrations there will be drastic losses.

However, there is some hope.

- While changes are necessary throughout the economy major reductions in greenhouse gases are technically and economically feasible. Using a range of different technologies and changes to behavior we can reduce emissions. Many changes actually save money. For instance, using more energy efficient equipment can save both industry and consumers money.
- A number of studies have discussed the emission reductions that could occur at no cost to the economy. One of the best known Canadian studies found that Canadian emissions could be reduced by 20% by 2010 at no cost to the economy.
- Measures to reduce greenhouse gas emissions often yield additional environmental or social benefits. These benefits can make them worth doing in their own right.
- For instance, if you tackle greenhouse gases from cars you will decrease local air pollution. The solutions for reducing emissions from cars reduce local pollution. Decreasing motor vehicle use, smaller cars, using electric cars and shifting to alternative fuels all reduce greenhouse gas emissions, and local pollution. (Unfortunately the opposite is not always true; emission control devices on gasoline cars do not decrease greenhouse gas emissions).

Why aren't cost effective changes happening? Slide 8

Despite the fact that many changes are worthwhile they are not happening there are a number of economic barriers to cost effective changes happening.

- First, even if something is cost effective people don't always do it. Consumers and industry are not willing to invest in energy efficiency unless reduced energy bills pay back their investment very quickly.
- At current gasoline prices consumers are not interested in fuel efficient cars. As a result fuel efficiency has got worse over the last ten years.
- Often the person who has to make the investment is not the person who reaps the benefit.
- e.g. When factories switch to cleaner, less carbon intensive fuels, they do not get the benefit of reduced health care costs caused by reduced pollution.
- e.g. A landlord does not get the benefit of reduced electric bill when he insulates his tenant's house.

- Often consumer does not have knowledge necessary to make right decisions.
- Subsidies and tax rules often favour energy consumption e.g Hibernia, Syncrude.

How do we get over these Barriers to Change. Slide 9

A number of measures can be taken to overcome these changes.

- Governments can use their regulatory powers to overcome many of these problems: they can require improved fuel efficiency for cars, requiring improved insulation on new homes.
- They can adopt zoning which curbs urban sprawl and decreases dependence on cars.
- They can improve public transit to decrease car use.

However, this type of government regulation will never be the complete answer. Widespread changes are necessary throughout the economy. Government policy makers simply do not have the ability to regulate every aspect of the economy to make sure people and corporations do not waste energy.

Price signals are needed that encourage industry to design fuel efficient processes and encourage people to drive less.

- Simplest and possibly most effective way of creating these price signals is a tax on fossil fuels. If products which lead to greater emissions of greenhouse gases cost more there would be an incentive for consumers to shift to products that don't lead to as high emissions. For instance, a carbon tax would encourage consumers to buy more fuel efficient cars that use less carbon intensive fuels. It would encourage homeowners to turn down the heat and insulate.
- Revenue from a carbon tax could be used to replace revenue from other taxes. If income tax is reduced Canada would become more competitive in labour intensive sectors of the economy.

Why aren't these policies happening? -- Political Barriers Slide 10

- Even though changes may be good for the economy as a whole they do not benefit every industry. Some industries have a lot to lose from tough measures.

For instance:

- car manufacturers will have to incur costs to increase fuel efficiency. They will not benefit from increased fuel efficiency. Car manufacturers can be expected to fight any strong measures that will cost them money. They will spend money on media campaigns exaggerating the costs of increased fuel

efficiency. Politicians are reluctant to risk angering large industries when it is not clear the public will recognize the need for what they are doing.

- The oil and coal industries will be clear losers. They will fight for their survival. They are already using PR firms to say that global warming is not a problem.
- An example of this sort of misinformation is a video called *The Greening of Planet Earth*. It is produced by a consortium of coal interests and not surprisingly tries to make global warming into a boon for the globe. It talks about super agricultural yields and desert reclamation because of increased carbon dioxide concentrations. It ignores forecasts of increased pestilence, increased drought, decreased summer water supply, increased storms, and the inability of forests to keep up with changing conditions.
- Also there is a lack of understanding about the problem. Politicians fear a carbon tax would be seen as a tax grab, even if the revenue was used to reduce income tax. Tax increases are unpopular.

Why Aren't Changes Happening? Lack of International Cooperation Slide 11

Another difficulty in reducing greenhouse gas emissions is a lack of international cooperation. International Cooperation is needed for two reasons:

- First, no country is going to be able to solve the global climate change problem unilaterally. There is a need for all industrialized countries to take emission reduction measures.
- Second, it is more difficult for any single country to adopt tough measures without international cooperation.
- For instance if Canada adopted a high carbon it would increase the costs for some of industries. In the case of Canada many of primary industries are export oriented and are use large quantities of energy (they are energy intensive). For instance, paper manufacturing, oil production, mining and mineral processing all have high energy inputs. There is a concern that Canada would be less competitive in these areas if we unilaterally imposed a carbon tax. Although tax can be designed to avoid these impacts, it would take away from its effectiveness.
- Unfortunately the prospects for effective cooperation are daunting. There are international negotiations underway to come up with binding commitments by 1997, but the prospects are limited in this round of negotiations.

- Cooperation is particularly difficult because countries have very different interests. For instance, oil and coal producing countries which make money on selling fossil fuels do not want to reduce burning of fossil fuels as they see it as bad for their economy. Island states see not dealing with global warming as the end to their existence.
- Agreeing to reduction targets is also difficult because of different perspectives on what emission reduction targets are fair. Emissions per capita in North America are 10 times higher than emissions in China and 15 times higher than the remaining third world. Poor countries want to enjoy our level of wealth and want to use fossil fuels to get achieve increased wealth. They are not willing to make reductions to solve a problem caused by the North.

Are No-Regrets measures enough? Slide 12

Earlier I noted that there are many changes that can reduce emissions and would be good for the economy. There are also changes that are worth doing for other environmental reasons. However, we also have to consider even greater changes -- changes to our level of consumption. If we want to stabilize concentrations of greenhouse gases at current levels the world needs to reduce emissions by 60%. Rich countries would have to make even greater emissions reductions. I am not sure if we will succeed in that goal, but even stabilizing concentrations at a higher level would mean dramatic reductions. I do not believe different technologies will solve the problem. They will help, but I think we will need -- do need -- to reduce our consumption.

Summary

I have spoken about many barriers to change. Internationally its hard to get countries to cooperate. Even where measures would be good for the economy, politicians are afraid to incur the wrath of gasoline buyers and industry. To make even greater reductions of greenhouse gas emissions -- reductions which will actually stop climate change we need to reduce our levels of consumption. This is something which is even less politically popular.

- Nonetheless, I'm optimistic about the prospects for positive change:
 - More individuals recognize that the car is causing major problems with our environment.
 - More people are aware of the need to decrease energy waste.
 - People are starting to question the ethic of continued economic expansion.
 - Politicians are starting to talk tough about global warming.
- If enough pressure is put on them they will act.

What Individuals Can Do -- Slide 13

Growing Awareness amongst individuals makes me hopeful. There is much an individual can do.

- Make energy use a political issue. Call for carbon taxes, strict energy efficiency standards, road tolls, legislation to curb urban sprawl.
- Drive less. Ride your bike to school. Try to work at home.
- Energy efficient appliances -- fridges, heaters etc. Although, B.C. relies heavily on electricity from hydro dams, BC Hydro relies on burning natural gas to make up for a short fall between hydro generating capacity and greater Vancouver's electrical demand. Conserving electricity will lead directly to less greenhouse gas emissions.
- Weather proof and insulate houses.
- Use natural gas over oil or gasoline if possible.
- Reduce use of energy intensive products like paper and alluminum. Use a broom instead of a vacuum cleaner.
- Recycle paper and alluminum.
- Plant trees around your house. (Cools house in summer, warms it in winter and stores carbon).
- Reduce consumption.

<http://old.wcel.local/default.cfm>

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