



Chapter 20

Global Environmental Problems

For ECON 260 at SFU only

Learning Objectives

- LO1 Describe desirable design features of GHG pricing policies.
- LO2 Explain how design principles apply to examples of emission trading.
- LO3 Describe the features of Canadian GHG policies and how they use carbon pricing.
- LO4 Explain how international agreement was reached to eliminate CFCs and how price incentives helped achieve the goals.
- LO5 Explain why it is important to conserve biodiversity

Global Climate Change

- Significant reductions in emissions required immediately to prevent further global warming
- Economists united in advocating some form of pricing mechanism to help achieve emission reduction targets, such as carbon pricing mechanisms
- Two principles of carbon pricing:
 - Taxes
 - TEPs

Global Climate Change

Desirable design of GHG pricing schemes:

- Comprehensive coverage of emissions
- Uniform price applied to all emissions
- Stable and predictable emissions prices
- Emissions prices aligned with environmental damages or climate stabilization goals
- Minimizing the fiscal dividend
- Carefully targeted compensation schemes for vulnerable households and firms

GHG Pricing Schemes

- Insert Table 20-1

Design Principles and TEP

- Transferrable Emissions Permit (TEP) credit system:
 - Comprehensive coverage of emissions
 - Emissions prices aligned with environmental damages or climate stabilization goals
 - Minimizing the fiscal dividend

Design Principles and TEP

- TEP substance trading:
 - Comprehensive coverage of emissions
 - Uniform price applied to all emissions
 - Stable and predictable emissions prices
 - Emissions prices aligned with environmental damages or climate stabilization goals

Design Principles and TEP

- TEP emission-rights trading:
 - Comprehensive coverage of emissions
 - Stable and predictable emissions prices
 - Emissions prices aligned with environmental damages or climate stabilization goals
 - Minimizing the fiscal dividend

Canadian GHG Policies

- Canadian federal policy is based largely on direct regulation and subsidies to encourage substitution **away from carbon-intensive fuels.**
 - No federal carbon tax or TEP system
- Features of Canadian GHG policies:
 - Subsidies to renewable energy, ethanol;
 - Technological incentives to find ways to sequester CO₂;
 - Moral suasion to induce people to reduce emissions;
 - Voluntary agreements with industry;
 - Incentives to increase energy efficiency
 - Direct regulations to be introduced for emitting sectors

Provincial Targets, Emissions, MAC

- Table 20-2 Provincial GHG Targets, Emissions, and Marginal Abatement Costs

Province	1990 GHG Emissions Mt CO ₂ e (million tonnes)	2012 GHG Emissions Mt	Emission Reduction Target for 2020	Estimated Marginal Abatement Costs to Reach Target
British Columbia	49	60	33% below 2007 level (22 Mt)	\$266/tonne CO ₂ e
Alberta	170	249	50 Mt below business as usual	\$159
Saskatchewan	44	75	20% below individual baselines	\$134
Manitoba	19	21	6% below 1990 level	\$226
Ontario	177	167	15% below 1990 level	\$257
Quebec	84	78	20% below 1990 level	\$219
Canada	591	699	17% below 2005 level	

Sources: Emissions data: Greenhouse Gas Emissions Tables. Accessed November 3, 2014 at www.ec.gc.ca/indicateursindicators/default.asp?=BFB1B398#ghg4.

Emissions targets: Provincial Web pages.

Marginal abatement costs: Nic Rivers, "Federal and Provincial Climate Change Policy: Repeating Past Mistakes?" in Tom Courchene and John Allen (eds.) *Carbon Pricing and Environmental Federalism*, in the series, *Canada, The State of the Federation*, 2009. Montreal: Queen's-McGill Press, 2010.

Carbon Taxes in Canada

- Provincial adoption of federal policy:
 - Implementation of energy efficiency incentives,
 - Subsidies to promote the use of renewable energy sources to generate electricity,
 - Consumer information on how to reduce GHG emissions,
 - Subsidies for technology, etc
- British Columbia carbon tax:
 - Majority of emissions emanate from transportation
 - BC :10% reduction in CO₂ emissions from 2008-2011
 - Rest of Canada: 1.1% reduction in CO₂ emissions

Carbon Taxes in Canada

- Implicit carbon taxes:
 - Implicit carbon taxes higher than US, lower than Europe
 - Inversely related to carbon intensity of fuel

Table 20-5 Implicit Carbon Tax Rates Across OECD Countries, 2008 (in Canadian \$/tonne CO₂)

Fossil Fuel	Canada	United States	Germany	United Kingdom	Norway
Gasoline	\$146	\$62	\$590	\$560	\$625
Diesel	99	56	273	368	275
Light fuel oil	34	17	108	93	229
Heavy fuel oil	17	9	13	50	72
Steam coal	0	0	0	3	34
Natural gas (industrial use)	0	0	17	5	N/A

Source: Data from International Energy Association as compiled by Erick Lachapelle, "The Hidden Factor in Climate Policy: Tracking Implicit Carbon Taxes in the OECD and Implications for Canadian Policy Makers" (2010) (Ottawa: Sustainable

Prosperity), www.sustainableprosperity.ca.

The Montreal Protocol

- 1987: 24 nations signed *The Montreal Protocol on Substances that Deplete the Ozone Layer*.
 - Signatories to decrease CFCs and halons to 50%
- Reduction not enough for 2 reasons:
 - Problem was getting worse
 - Large CFC-producing countries hadn't signed protocol
- 1990: Montreal Protocol countries agreed to phase out CFCs completely by 2000
 - CCl and methyl chloroform added to list
 - Longer-run schedule for phasing out HCFCs

The Montreal Protocol

- Factors that made the Montreal Protocol a successful international treaty:
 1. Link between the pollutants released and environmental damages clearly established by the science.
 2. Political leaders accepted the scientific evidence
 3. Relatively few compounds responsible for ozone depletion
 4. The treaty contained a compensation method for developing countries that allowed them to sign the agreement

Price Incentives and the Montreal Protocol

- International competition in the CFC industry helped lead the phase-out of CFCs
 - Companies such as DuPont which are leaders in the development of substitutes for CFCs to benefit
- Compensation fund for developing countries
 - Without fund, cost of phasing out ozone-depleting compounds would put a bigger burden on their economies than those of the wealthier nations

Biological Diversity

- Biological diversity has several levels:
 - Genetic diversity, species diversity, diversity among ecosystems
- Biological uniformity produces inflexibility and weakened ability to respond to new circumstances
 - Diversity gives a system the means to adapt to change
- Maintenance of biodiversity depends on maintenance of habitats so that complex biological equilibrium is preserved

Chapter Overview

This chapter discussed the importance of reducing green house gases and provided insight into ways to reduce emissions by explaining:

- GHG pricing policies
- Emission trading
- Features of Canadian GHG policies
- How the Montreal Protocol was a successful international agreement to reduce ozone-depleting substances

People do not recognize how serious the impacts are on the planet until the species and ecosystems are gone. Greater efforts and incentives to preserve habitat and promote economic activities compatible with species preservation are required.