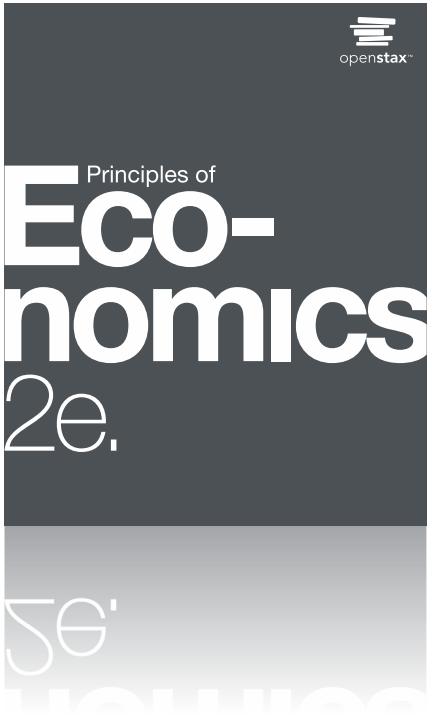
PRINCIPLES OF ECONOMICS 2e

Chapter 12 Environmental Protection and Negative Externalities



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CH.12 OUTLINE

12.1: Economics of Pollution

12.2: Command-and-Control Regulation

12.3: Market-Oriented Environmental Tools

12.4: Benefits and Costs of Environmental Laws

12.5: International Environmental Issues

12.6: Tradeoffs between Economic Output and Environmental Protection

12.1 The Economics of Pollution

- Since the 1970s, a variety of US anti-pollution policies have made genuine progress against a number of pollutants.

- Despite the gradual reduction in emissions from fossil fuels, many important environmental issues remain.

- Along with the still high levels of air and water pollution, other issues include:
  - hazardous waste disposal,
  - destruction of wetlands and other wildlife habitats,
  - and the impact on human health from pollution.

Externalities

- The effect of a market exchange on a third party who is outside or “external” to the exchange is called an **externality** or **spillover**.

- Externalities can be negative or positive.

  - **Negative externality** - a situation where a third party, outside the transaction, suffers from a market transaction by others.

  - **Positive externality** - a situation where a third party, outside the transaction, benefits from a market transaction by others.

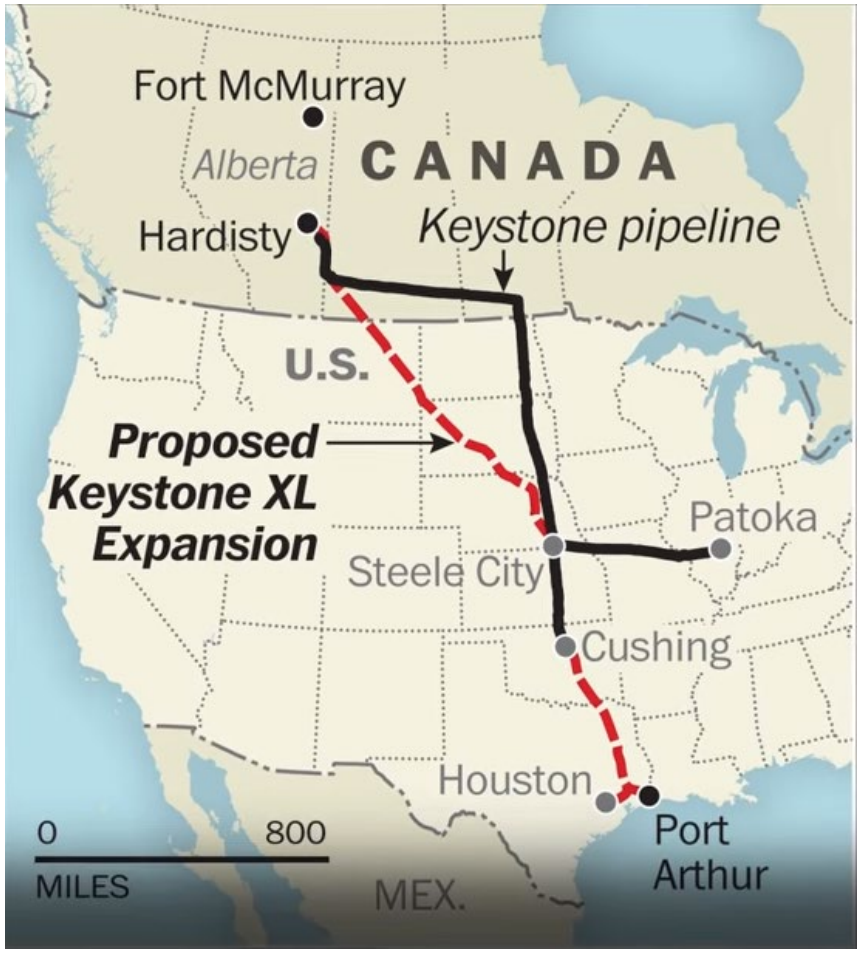
Pollution as a Negative Externality

- Pollution is a negative externality.
- **Additional external costs** - additional costs incurred by third parties outside the production process when a unit of output is produced.
- **Social costs** - costs that include both the private costs incurred by firms and also additional costs incurred by third parties outside the production process.

Costs and Benefits of Fracking

Video: Costs and Benefits of Fracking (Links to an external site.) by Brookings

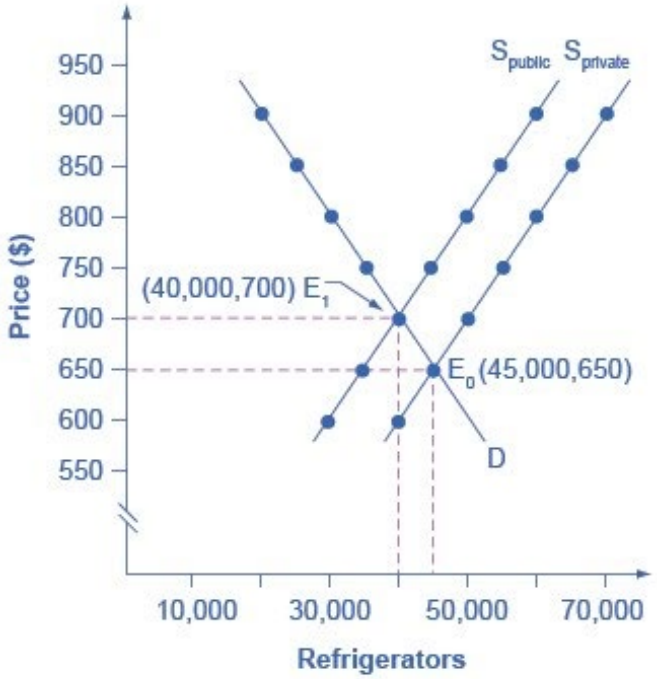
Keystone XL Pipeline



Video: [Canada tar sands] by TechInsider

Video: [What is the Keystone XL Pipeline?] by National Geographic

Taking Social Costs into Account: A Supply Shift



- If the firm takes only its own costs of production into account, then its supply curve will be $S_{private}$, and the market equilibrium will occur at E_0.
- Accounting for additional external costs of $100 for every unit produced, the firm's supply curve will be S_{social}. The new equilibrium will occur at E_1.

Market Failure

- **Market failure** - when the market, on its own, does not allocate resources efficiently in a way that balances social costs and benefits; externalities are one example of a market failure.

- If firms were required to pay the social costs of pollution, they would create less pollution but produce less of the product and charge a higher price.

Tragedy of the Commons

Video: [The Tragedy of the Commons](#) by Jesse Agar

12.2 Command-and-Control Regulation

- **Command-and-control regulation:**
  - laws that specify allowable quantities of pollution
  - may also may detail which pollution-control technologies one must use.

- Requires that firms increase their costs by installing anti-pollution equipment.

- Thus, firms are required to account for the social costs of pollution in deciding how much *output* to produce.

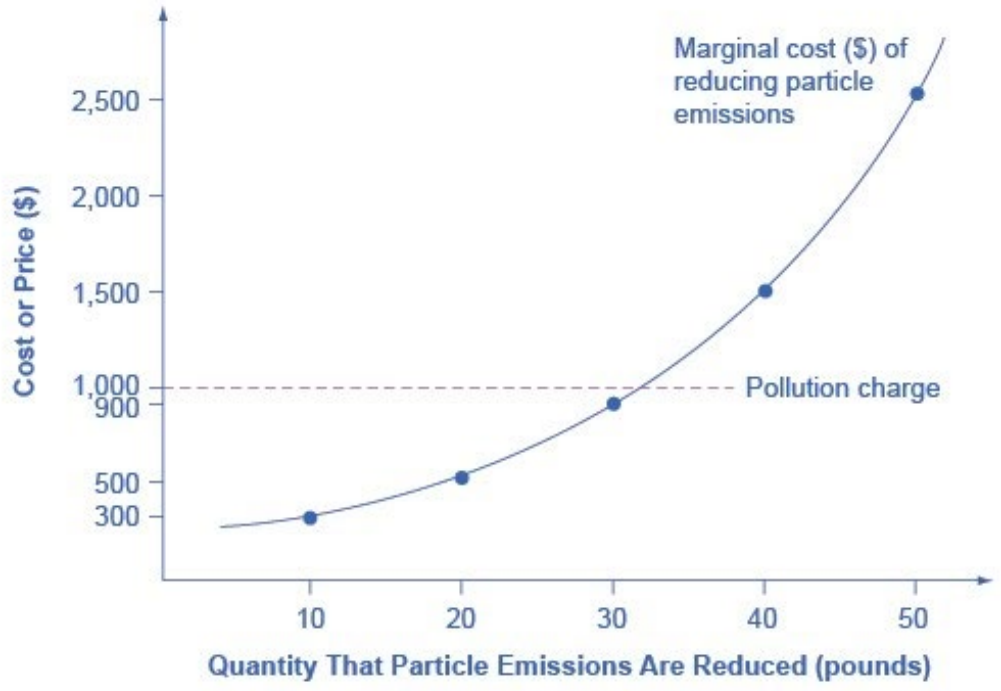
Difficulties with command-and-control environmental regulation

- 3 difficulties with command-and-control environmental regulation:
  - Regulation offers no incentive to improve the quality of the environment beyond the standard set by a particular law.
    - No incentive to do better.
  - Inflexible.
    - Requires the same standard for all polluters, and often the same pollution-control technology as well.
  - Subject to compromises in the political process.
    - Full of fine print, loopholes, and exceptions.

12.3 Market-Oriented Environmental Tools

- **Pollution charge** - tax imposed on the quantity of pollution that a firm emits.
  - Gives a profit-maximizing firm an incentive to determine the least expensive technologies for reducing pollution.
  - Firms that can reduce pollution cheaply and easily will do so to minimize their pollution taxes.

A Pollution Charge Example



- If a pollution charge is set equal to $1,000, then the firm will have an incentive to reduce pollution by 30 pounds,
- Because the $900 cost of these reductions would be less than the cost of paying the pollution charge.

Marketable Permits

- **Marketable permit program** (e.g. cap-and-trade) - a permit that allows a firm to emit a certain amount of pollution.

- Firms with more permits than pollution can sell the remaining permits to other firms

Better-Defined Property Rights

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- **Property rights** - the legal rights of ownership on which others are not allowed to infringe without paying compensation.

- Property rights issues are highly relevant in cases involving endangered species on privately owned land.

12.4 The Benefits and Costs of U.S. Environmental Laws

- Benefits of a cleaner environment:

  (1) people may stay healthier and live longer;

  (2) certain industries that rely on clean air and water, such as farming, fishing, and tourism, may benefit;

  (3) property values may be higher;

  (4) people may simply enjoy a cleaner environment in a way that does not need to involve a market transaction.

Marginal Benefits and Marginal Costs

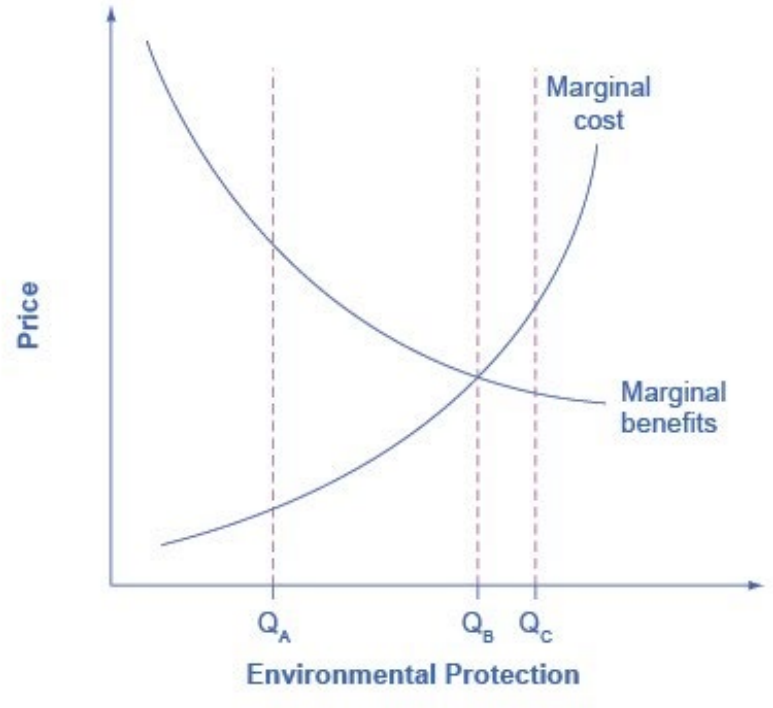
- Tools of marginal analysis can be used to illustrate the marginal costs and the marginal benefits of reducing pollution.

- Reducing pollution is costly - resources must be sacrificed.

- The marginal costs of reducing pollution are generally increasing,
  - The least expensive and easiest reductions can be made first, leaving the more expensive methods for later.

- The marginal benefits of reducing pollution are generally declining,
  - The steps that provide the greatest benefit can be taken first, and steps that provide less benefit can wait until later.

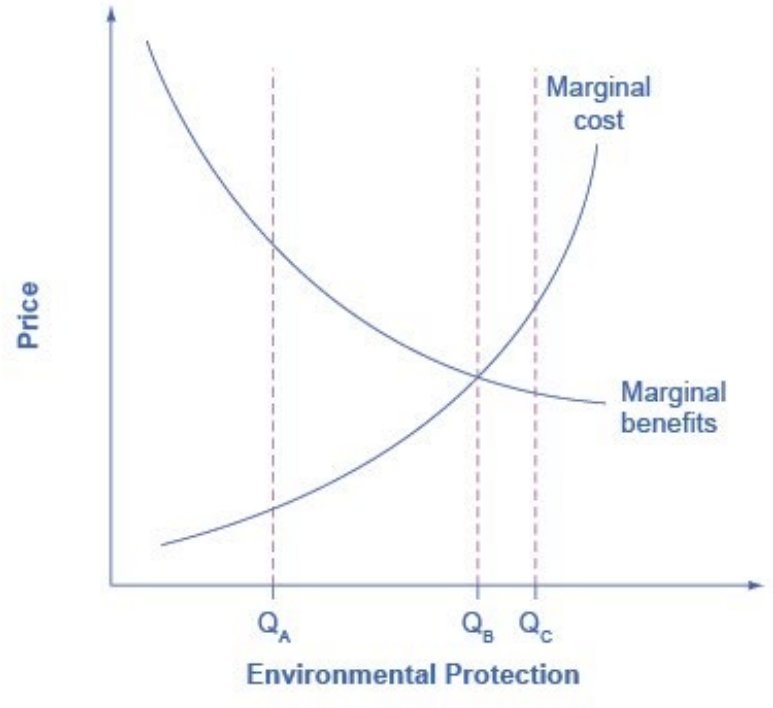
Marginal Costs and Marginal Benefits of Environmental Protection



- When the quantity of environmental protection is low (Q_A):
  - Pollution is extensive.
  - There are cheap and easy ways to reduce pollution.
  - So, the marginal benefits of doing so are quite high.

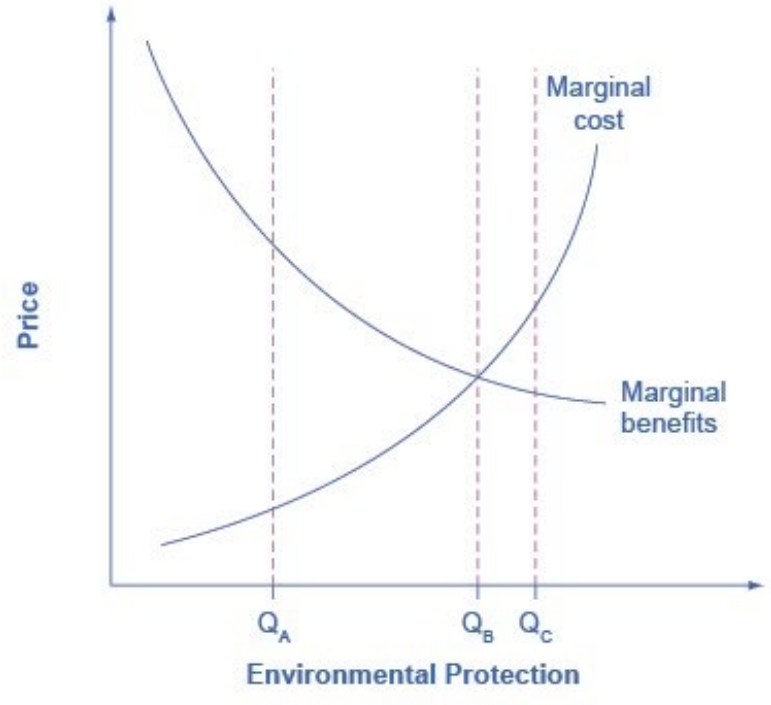
- At Q_A, it makes sense to allocate more resources to fight pollution.

Marginal Costs and Marginal Benefits of Environmental Protection, Continued



- As the environmental protection increases:
  - the cheap and easy ways of reducing pollution begin to decrease, and one must use more costly methods.
  - the marginal cost rises.
  - the largest marginal benefits happen first, followed by reduced marginal benefits.

Marginal Costs and Marginal Benefits of Environmental Protection, Continued



- As the quantity of environmental protection increases to Q_B, the gap between marginal benefits and marginal costs narrows.
- At point Q_C the marginal costs > marginal benefits.
- At this level of environmental protection, society is not allocating resources efficiently.
  - It may be forfeiting too many resources to reduce pollution.

12.5 International Environmental Issues

- Certain environmental problems spill over national borders.
- **Biodiversity:** the full spectrum of animal and plant genetic material.
- **International externalities:** externalities that cross national borders and that a single nation acting alone cannot resolve.
  - No nation by itself can reduce emissions of carbon dioxide and other gases by enough to solve the problem of global warming.

Fossil Fuels and Climate Change

- High-income countries have historically been the primary contributors to greenhouse warming by burning fossil fuels - and still are today.

- Paris Climate Agreement - committed participating countries to significant limits on CO_2 emissions.

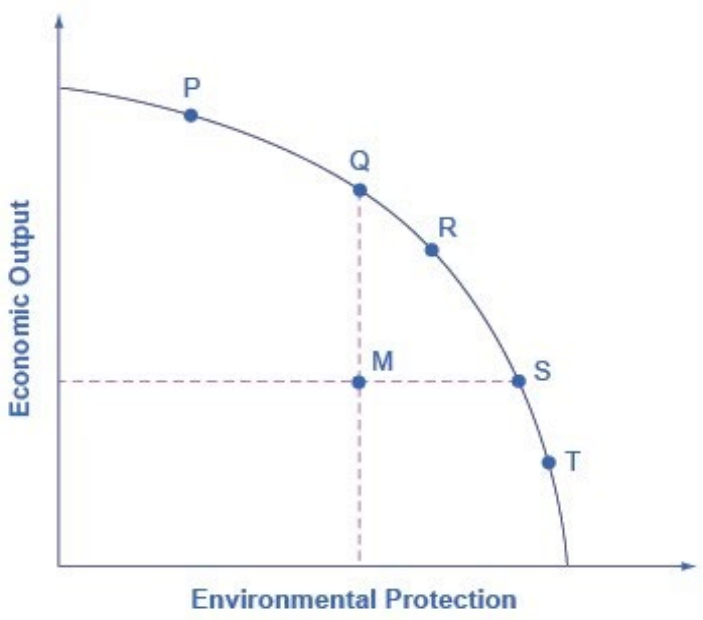
Details of an International System

- The practical details of an international system and how it would operate across international borders are complex.
- It seems unlikely that some form of world government will or can impose a detailed system of environmental command-and-control regulations around the world.
- As a result, a decentralized and market-oriented approach may be the only practical way to address international issues such as global warming and biodiversity.

12.6 The Big Tradeoff: Economic Output vs Environmental Protection

- The tradeoff between *economic output* and the *environment* can be analyzed with a production possibility frontier (PPF).
- Economists believe that an inefficient choice on the PPF is undesirable.
- Market-oriented environmental tools offer a mechanism for providing either the same environmental protection at lower cost, or providing a greater degree of environmental protection for the same cost.

The Big Tradeoff: Economic Output vs Environmental Protection



- Each society will have to weigh its own values.
- Will decide whether it prefers a choice like P, with *more economic output* and *less environmental protection*,
- Or a choice like T, with *more environmental protection* and *less economic output*.
- An inefficient choice such as M is undesirable.

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