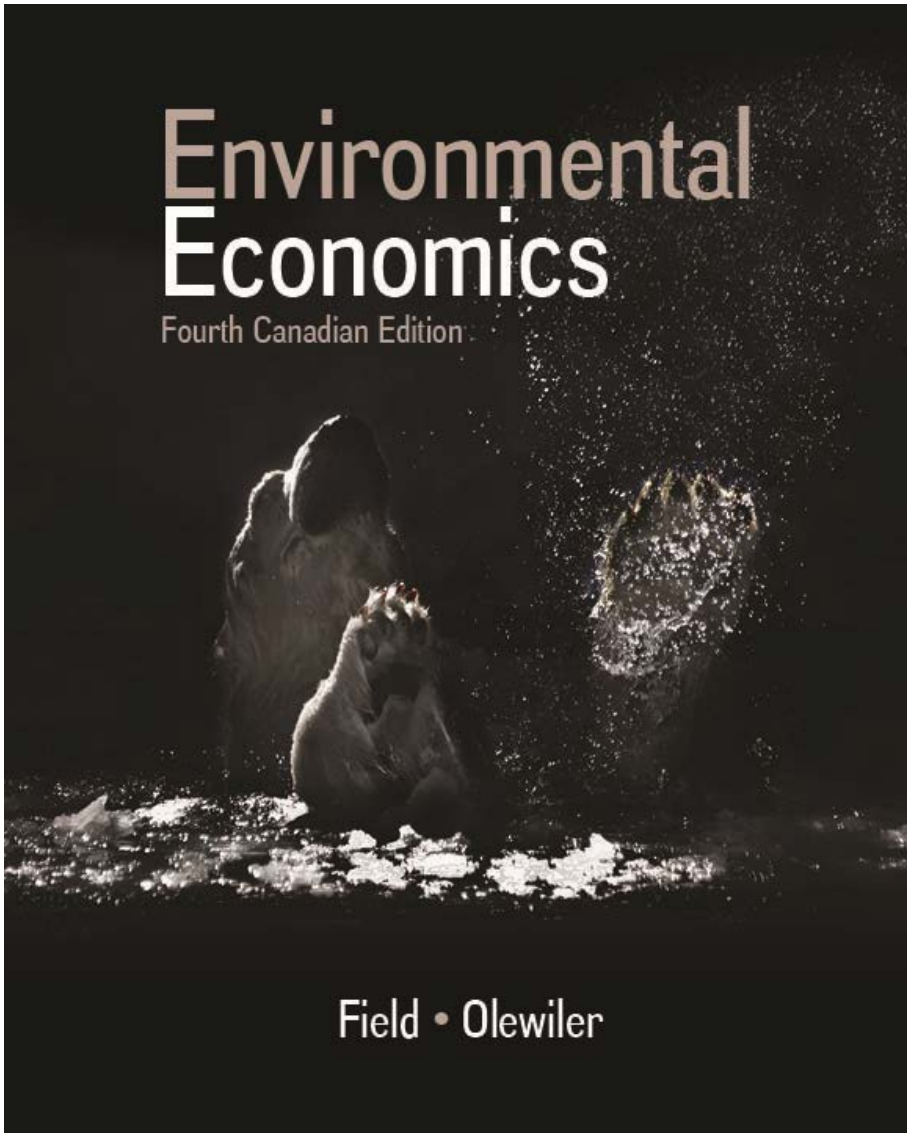


Chapter 11

Standards

For ECON 260 at SFU only

Learning Objectives

LO1 Define and illustrate graphically the socially efficient equilibrium emission standard and explain its advantages.

LO2 Describe and contrast the different types of standards that can be introduced as direct regulation.

LO3 Explain the complexities introduced in setting standards when marginal damages differ by region or time of day or other factors.

LO4 Describe and illustrate graphically how to achieve a cost efficient equilibrium under a standard when the MAC curves for polluters differ.

LO5 Explain the degree of flexibility of different types of standards and their ability to spur investment in new technologies that can lower emission intensity.

LO6 Describe the challenges faced in enforcement of standards.

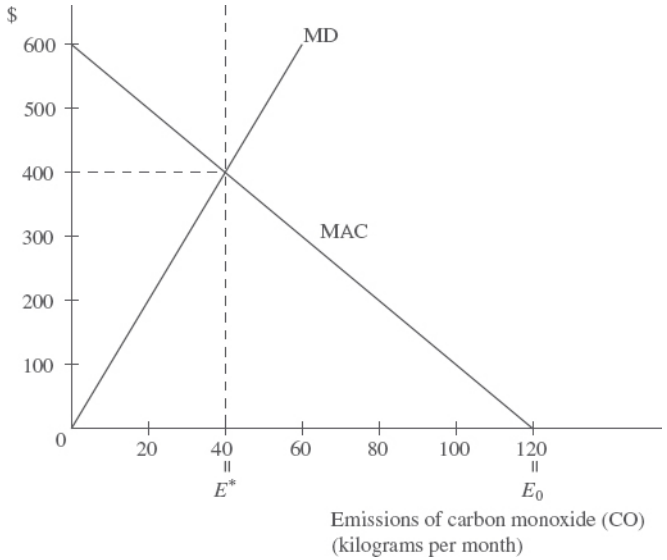
What are Environmental Standards?

- **Standards** are a type of command-and-control (CAC) technique, also known as direct regulation.
- For example, an **emission standard** is a maximum rate of emissions that is legally allowed.
- A governing body simply makes it illegal to emit past a certain level and uses courts, fines, and other law enforcement measures to ensure compliance.

LO1

The Socially Efficient Standard

- FIGURE 11-1 The Socially Efficient Standard



- Figure 11-1 shows E* where MD=MAC. This is the socially efficient standard, 40kg of Carbon Monoxide in this case.

- Emitters must pay the MAC up to this point. These costs are called compliance costs.

LO1

What are the Advantages of Standards?

- Appear to be simple and direct.
- Apparently set clearly specified targets.
- Appeal to people's sense of getting environmental pollution reduced immediately.
- Are consistent with our ethical sense that pollution is bad and ought to be declared illegal.
- Conform to an operation of the legal system, which is to define and stop illegal behaviour.

LO1

Types of Standards

- There are three types of environmental standards.
  1) -Ambient Standards
  2) -Emission Standards
  3) -Technology Standards

- Canada uses each of these standards across different industries to control pollution.

LO2

Ambient Standards

- An **ambient standard** is a never-exceed level for a pollutant in the ambient environment.

- For example, an ambient standard for dissolved oxygen in a particular river may be set at 3 parts per million (ppm), meaning that this is the lowest level of dissolved oxygen that is to be allowed in the river.

- To ensure that dissolved oxygen never falls below 3ppm in the river, we must know how the emissions of the various sources on the river contribute to changes in this measure, then introduce some means of controlling these sources.

LO2

Emission Standards

- **Emission standards** are never-exceed levels applied directly to the quantities of emissions coming from pollution sources.

- Emission standards can be set on a wide variety of different bases. For example:
  - Emission rate (e.g., kilograms per hour),
  - Emission concentration (e.g., parts per million of biochemical oxygen demand, or BOD, in wastewater),
  - Percentage removal of pollutant (e.g., 60-percent removal of waste material before discharge).

- In the language of regulation, emission standards are a type of performance standard, because they refer to end results that polluters who are regulated must achieve.

Ambient vs. Emission Standards

- Setting emission standards at a certain level does not necessarily entail meeting a set of ambient standards. This is due to naturally occurring processes.

- Sometimes the environment will convert a certain type of pollutant into something more damaging. As a result, ambient environmental quality depends on emissions and natural degradation. This is often the case with organic pollutants.

- Researching the link between emission levels and ambient quality levels is a major part of environmental science.

Technology Standards

- There are numerous standards that don't actually specify some end result, but rather the technologies, techniques, or practices that potential polluters must adopt. We lump these together under the heading of technology-based standards (TBS).

- For Example, The requirement that cars be equipped with catalytic converters, or seat belts, is a technology standard.

Technology Standards vs Performance Standards

- The difference between a performance standard and a technology standard may become blurred at the edges. The basic point of differentiation is that:

  -A performance standard, such as an emission standard, sets a constraint on some performance criterion and then allows people to choose the best means of achieving it.

  - A technology standard actually dictates certain decisions and techniques to be used, such as particular equipment or operating practices to be used by polluters.

LO2

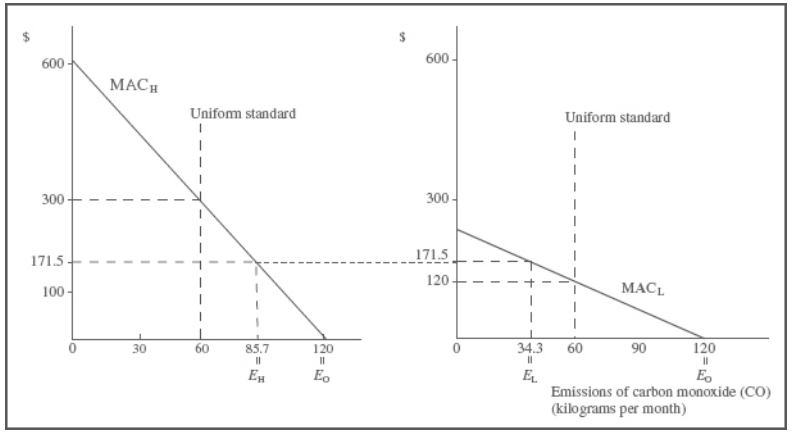
Setting Standards

- Setting a uniform standard across different areas creates inefficiencies due to geographic differences.
  - For example, low air quality in an urban area is likely to cause more damage than in a sparsely populated rural area. So the efficient level of pollution can not be achieved in both areas under the same standard.
- When marginal damages for a pollutant vary by region, time of day, or season, a uniform standard will not be socially efficient.

LO3

Cost-Effectiveness when Marginal Abatement Cost Curves Differ

Figure 11-4 Cost-Effectiveness when Marginal Abatement Cost Curves Differ



- Figure 11-4 shows the marginal abatement cost relationships for two different carbon monoxide sources of emissions.
- One producer has a higher MAC than the other. This results in one factory spending more money to abate to the required level than the other. This is not cost-effective because it does not follow the equimarginal principle. At 60 kilograms controlled each, MAC H greatly exceeds MAC L

- For example, If individual standards are set at 34.3 kilograms/month for L and 85.7 kilograms/month for H. The policy is cost-effective and results in lower total costs of abatement to reach the target level of emissions.

LO4

Investment in New Technologies

- Command and Control standards often do not provide incentive to find new ways of reducing emissions.
  - If the standard is being met, there is no incentive to do any better than the standard, even though the costs of further emission reductions might be quite low.
  - Technology standards create poor incentive to develop new technology because if it were developed, there is no guarantee it could not be used.

- Polluters have to meet the standard (or face penalties) even if the costs of complying may be much more than the damages reduced. This is not cost-effective.

LO5

Technology Forcing

- Creating extremely high standards that are not possible with today's technology can force polluters to develop new control methods and is called **technology forcing**.

- For example: A mandate that 50% of vehicles sold must be zero emission vehicles (such as electric cars) might force companies to invest in the development and production of a new generation of electric cars
  - A problem might occur if the technology is not ready for adoption – for example, battery limitations make electric cars expensive and limited in application at this time, and producers may be required to sell cars consumers do not want to buy

LO5

Enforcing Standards

- With limited enforcement budgets regulators must often rely on **self-monitoring** where sources themselves keep the books on emissions flows over time and is common in Canadian environmental protection.

- Tolerable levels of compliance may still be attainable with self-monitoring and random audits.

- Why would a polluter report honestly? The typical reason is a strong incentive to do so provided by the system of fines.

LO6

Setting and Enforcing Standards

- One very common feature of environmental standards is that they are usually set and enforced by different groups of people. Standards are often set by national authorities; enforcement is usually done by local authorities.
- For example, the air-quality standards established under the Canadian Environmental Protection Act are set at the federal level,but much of the enforcement is carried out by provincial agencies.
- If little thought is given to enforcement costs when a standard is set at the national level, local authorities are left to deal with high costs.

LO6

Chapter Overview

- In this chapter we specified three primary types of standards: ambient, emission, and technology.
- A leading problem with standard setting is the question of cost-effectiveness and the equimarginal principle. When marginal abatement costs differ among sources, as they almost always do, uniform standards cannot be cost-effective; individual standards are required.
- We examined the incentives standards might have to look for better ways of reducing emissions.
- Emission standards do create positive incentives for R&D in pollution control, though we will see that these are weaker than those of economic-incentive types of pollution-control policies, the subject of the next two chapters.