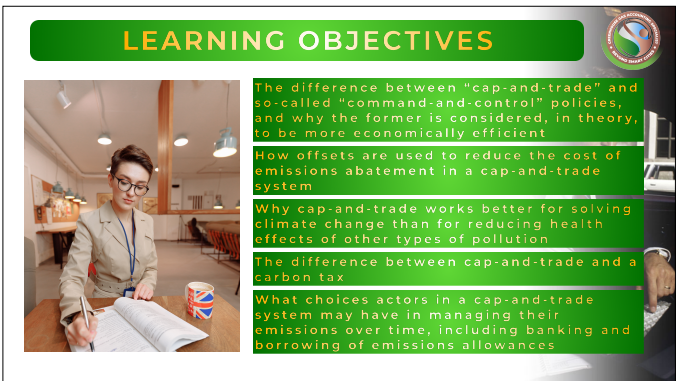








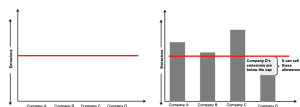
INTRODUCTION

Greenhouse gases share an important attribute: they have the same climate-changing effect wherever they are emitted. This attribute is due to the fact that greenhouse gases stay in the atmosphere for a long time (years to centuries) and mix uniformly in the atmosphere.

As a result, reductions in greenhouse gas emissions have the same mitigating effect everywhere. And when exactly they are reduced in the short-term—in other words, over the period of a year—does not matter. Solutions to other environmental problems are usually local, like cleaning up a polluted river or protecting a particular ecosystem for its unique biodiversity. But as greenhouse gases contribute to climate change regardless of where they are emitted, an emission reduction in one region of the world is just as effective as a reduction on the other side of the globe.

Governments therefore have an incentive to reduce greenhouse gas emissions as much as possible where it is the least expensive for society to do so, achieving more environmental gain for less economic cost.

INTRODUCTION +



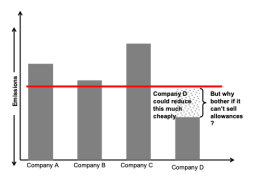
Emissions "cap-and-trade" is a type of public policy for dealing with environmental pollution. It is founded on an economic principle that the right to pollute should be limited, but that a free-market is the best way to allocate who uses those rights. With a cap-and-trade system, a government authority determines the maximum amount of greenhouse gases that may be emitted and what sources and geographies are placed under the cap.

This is known as the 'cap.' The government then issues or sells allowances, or permits to pollute, that represent a single unit of emissions (usually 1 metric ton carbon dioxide equivalent, or CO₂e) to facilities that emit greenhouse gases.

At the end of each period, usually one calendar year, each emitter must surrender one allowance per unit of emissions they release to the atmosphere. If a facility emits less than the amount of allowances it holds, it may sell its surplus allowances to other emitters. Conversely, if a facility does not hold enough allowances to cover its emissions for the period, it must buy allowances from the market. This is known as the 'trade' portion of 'cap-and-trade'.

INTRODUCTION +

To illustrate a cap-and-trade system, let's take an example of two firms: Company A and company B. Company A emits 12 million tons, while company B emits 15 million tons. Each company was allocated allowances to emit ten million tons under the government's overall cap. Company B finds it too expensive to reduce its greenhouse gas emissions to this amount. Company A invests in a new technology that allows it to reduce emissions significantly – not only to the ten-million-ton level, but by an additional five million tons. It only has to surrender five million allowances to the government, and can thus sell the remaining allowances to Company B.

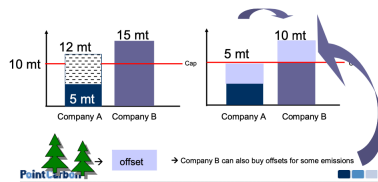


This command-and-control approach provides no incentive for an emitter to go beyond the government requirement, as there is no chance it could sell surplus allowances that it accrued by emitting less.

HOW IT WORKS

Company A has lower emission abatement costs

Company B purchases excess allowances from Company A



If the cap-and-trade system also involves emission reduction offset credits from projects that occur outside of capped sectors, Company B has another option for complying with the emission limit. It can "offset" its excess emissions by purchasing credits from projects that have reduced emissions elsewhere. The inclusion of offsets takes advantage of the same concept used in trade between companies, and incorporates the principle that a ton of CO₂-equivalent greenhouse gas emissions has the same effect anywhere in the world.

For example, it may cost a lot to install equipment that would reduce a power plant's emissions by 10 tons CO₂-equivalent per year. Yet it costs less to equip a landfill in another country to trap the greenhouse gas methane, preventing hundreds of tons of CO₂-equivalent per year from entering the atmosphere.

HOW IT WORKS +

Since more reductions can be achieved for less money at the landfill, the power plant could buy the emissions reductions caused by the landfill project and count them toward its emission reduction obligation under its government's cap. Overall, less money has been spent per unit of emission reduction, assuming that the landfill project would not have been undertaken without the opportunity to sell offset credits.

The cap-and-trade system is not always environmentally effective if used for pollutants that have an immediate local effect, such as in the case of highly toxic pollutants. In our example, if the impacts of the pollutants were primarily on the health of local residents then the area around Company B's facility would not become any less polluted while the area around Company A's facility would improve. However, greenhouse gases – especially the most prevalent one, carbon dioxide – are global pollutants, and have little if any effect locally. Using a cap-and-trade system to reduce greenhouse gases therefore does not directly cause greater pollution in one locality more than in another.

DIFFERENT APPROACH: A CARBON TAX

Another type of policy recommended by many economists to 'internalize the cost of greenhouse gas emissions into our economic decision-making' is a tax on emissions.

The tax should be set at a level estimated to reflect the social cost (meaning the cost of the impacts of pollution that are not captured in the market price) of each unit of greenhouse gas emissions.

Under the tax approach, fossil fuels would be taxed for their carbon content, which is directly proportional to the amount of carbon dioxide emitted when they are combusted for energy. A tax would cause fuels, like gasoline, to cost more and thereby encourage consumers to conserve.

Energy intensive goods and services would become more expensive, and consumers would be incentivized to avoid goods and services associated with high greenhouse gas emissions. Because the overall cost of emitting greenhouse gases becomes part of the price of goods and services, consumers will adjust their buying behaviour and choose less carbon-intensive products. Producers on the other side can compete by offering lower emission products (which, all else equal, will be cheaper).

DIFFERENT APPROACH: A CARBON TAX

In theory, both taxes and cap-and-trade result in emitters reducing their greenhouse gas output, and both would change the relative prices of good and services equally. The main difference between taxes and a cap-and-trade system is what aspect is controlled and what is left to the market to work out. With a tax the price is set, while the level of emissions is determined by the market based on the cost to reduce. Firms know what their costs will be because the tax is certain, but we don't know how much will be emitted because we cannot know the impact of this tax on behavior.

With a cap-and-trade system, the emissions limit is set (at the level of the cap) by the government, while the price of reducing emissions to this level is determined by the market. So the total cost to society of reducing emissions is unknown, but we have environmental certainty because we know emissions will be reduced to the level of the cap.

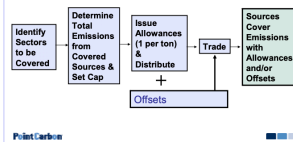
DESIGN OF A CAP-AND-TRADE SYSTEM

The success or failure of a cap and trade system hinges on the quality of its design. The following are a few critical questions for the design of a system.

Identify Sectors to be covered, Determine total emissions from covered sources & set cap, Issue allowances (1 per ton) & distribute, offsets, Trade, Sources cover Emissions with Allowances and/or Offsets.

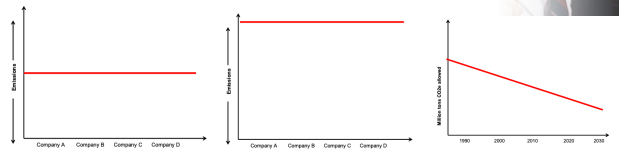
Scope: What is the scope of the cap and trade system? What sectors will it cover? Some Cap- and-Trade systems cover only the power sector while others cover almost all major sources of emissions.

Designing a Cap-and-Trade Program



DESIGN OF A CAP-AND-TRADE SYSTEM

Cap: Once the scope is set, regulators must determine the level of the 'cap'. The cap is the total number of allowances issued for a given year. If the cap is set too high and too many allowances are issued, emitters will have no incentive to reduce, making the allowances, in effect, worthless. If the cap is set too low, with too few allowances issued, the cost of meeting the cap may be so severe that economic growth is severely impacted and political pressure against the system may lead to its repeal.



DESIGN OF A CAP-AND-TRADE SYSTEM

Most cap-and-trade systems tighten the cap over time, issuing fewer and fewer credits. Over time, as credits become more scarce, the price of carbon will rise unless new equipment can be installed and technologies developed that make reducing emissions cheaper in the future.

Allocation: After the cap is determined, the tradable allowances must be distributed to individual emitters. Allocation can be done either by distributing the allowances for free to emitters, or through an auction in which the government sells them.

Offsets: As we mentioned earlier in this lesson, emitters may "offset" their emissions by purchasing credits from projects that reduce greenhouse gases outside the capped sectors. Under most cap-and-trade systems, emitters are allowed to account for a portion of their emissions reductions with credits generated from offset projects. You will learn more about offsets in Lesson 3.

DESIGN OF A CAP-AND-TRADE SYSTEM +

Banking and Borrowing: To reduce the cost of compliance with carbon emissions limits, some cap-and-trade systems allow for emitters to 'bank credits' or to borrow allowances

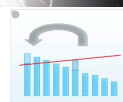
Allowing banking is considered more acceptable than allowing borrowing, since it does not run the risk of future nonpayment. Banking generally raises the price of allowances early in the program, as emitters buy allowances with the intention of saving them in the anticipation of using them when the cap becomes more stringent (and allowances more expensive), and lowers the price later on, as emitters withdraw allowances saved from earlier periods, reducing the cost of compliance.

Borrowing allowances has the opposite effect on price, it allows current compliance to be less costly, but makes future compliance more expensive, as future supply of credits is being reduced for today's use.

DESIGN OF A CAP-AND-TRADE SYSTEM +

In this picture, the red line represents a firm's expected emissions over time, while the blue bars represent the allowance budget under a cap-and-trade program – the latter decreases as the emissions cap decreases over time. A firm whose emissions are currently below the allowed limit may want to bank its excess allowances forward to a time when it will need them – a year in which its emissions are expected to exceed the allowance budget.

This picture shows a case of borrowing, in which a firm is already emitting more than its allowed amount. It can borrow from future allowance periods to cover its allowance shortfall now, but will be left with an even greater shortage of allowances later on.



CONCLUSION

In this lesson we have learned why and how cap-and-trade systems are employed to mitigate climate change. We've reviewed the basic principles that will determine how effective a cap-and-trade system will be. Keep these principles in mind during upcoming lessons where we explore how cap-and-trade systems are being implemented across the world.





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