

An Experiment with Emission Reduction Approaches

Instructor Notes

These notes are meant to accompany the description of an experiment with emission reductions approaches (fully described in a document entitled, 'A Classroom Experiment to Compare and Contrast Emission Reduction Approaches: Company and Societal Impacts of Command-and-Control, Environmental Tax and Tradable Permit Scenarios', and which is available from the author on request).

1) Setting up the experiment

Divide students into companies. Below is a suggestion as to the number of companies, given different numbers of students. The aim is to have between two and four students per company; of course, instructors may have different preferences. In any case, it is ideal to have company numbers in multiple of six (and simply do similar multiples of the cost-curves/worksheets, which are also available on this website, in a file entitled, 'An Experiment with Emission Reduction Approaches – cost-curves_worksheets').

Number of students	Number of companies
6-24	6
25-48	12
49-72	18

Distribute worksheets – one to each company.

Provide each company with \$12 and five tiddlywinks.

2) Command-and-control scenario

Announce that the government has declared that each company must reduce its emissions from five units to three units; in other words, each must eliminate two units of pollution.

Remind students that the 'technology' exists at the front of the room to help them achieve this goal (but also remind them that it also costs them to use it).

Visit different companies individually, probing how companies are going to comply with the regulation.

Receive students at the front of the room: accept their money, place their emissions in the 'technology' (plastic bag), shake it, and declare the emissions 'gone'. Repeat for all companies.

Tell students to complete the bottom part of the worksheet – for this particular scenario.

Announce that emissions, which had been five units per company, are now only three units per company, and that each company knows how much it cost them to contribute to that overall goal.

3) Environmental tax scenario

Redistribute money and tiddlywinks so that each company again has 12 and five.

Announce that the government has decided to proceed with an environmental taxation strategy in order to achieve its emission reduction goal – namely, a tax of \$2 per emission.

Tell students that you will, in a few minutes, walk around to collect the tax.

Receive students at the front of the room: accept their money, place their emissions in the ‘technology’ (plastic bag), shake it, and declare the emissions ‘gone’. Repeat for multiple companies.

Walk around to each company and collect the tax.

Tell students to complete the bottom part of the worksheet – for this particular scenario.

Announce that emissions, which had been five units per company, are now only, on average, three units per company. Further note that each company knows how much it cost them to contribute to that overall goal.

4) Tradable permit scenario

Redistribute money and tiddlywinks so that each company again has 12 and five.

Distribute three permits to each company.

Announce that the government has decided to introduce a system of tradable emission permits, and that, soon, the government will verify that every company is in compliance – that is, that they have a permit for every unit of emission they have produced.

Announce that companies may trade permits, and that, ‘The trading period is now open for five minutes!’

Encourage trading.

Announce that trading has ended.

Receive students at the front of the room: accept their money, place their emissions in the ‘technology’ (plastic bag), shake it, and declare the emissions ‘gone’. Repeat for multiple companies.

Walk around to each company, to verify that there is one permit for every remaining emission (and match them up).

Tell students to complete the bottom part of the worksheet – for this particular scenario.

Announce that emissions, which had been five units per company, are now only, on average, three units per company. Further note that each company knows how much it cost them to contribute to that overall goal.

5) Review

Put summary slide on overhead computer screen. (See the document entitled, ‘An Experiment with Emission Reduction Approaches – summary of results’, on this website.)

Reveal the results of the command-and-control scenario, and lead a discussion about the reasons for the differences in costs.

Reveal the results of the environmental tax scenario (part 1), and ask about the two streams of money.

Reveal the results of the tax scenario (part 2), and ask companies to record their final level of money after they had received their tax reimbursement (of \$6 – the same for every company).

Discuss how this changes the individual and total numbers.

Reveal the structure for the results of the tradable permit scenario, and input the values by asking the companies for their own particular results.

Reflect upon the results of this scenario.

6) Debrief

Ask about companies’ decision-making strategies and procedures, and about what scenario they would prefer and why.

Ask about the impacts of the different scenarios upon society, and what scenario the government would prefer (and why).

Ask about the extent to which this experiment replicates what happens in ‘the real world’, encouraging students to draw upon their own experiences.

Provide summary and concluding remarks.

Ian Rowlands (irowlands@uwaterloo.ca, 2 September 2014)