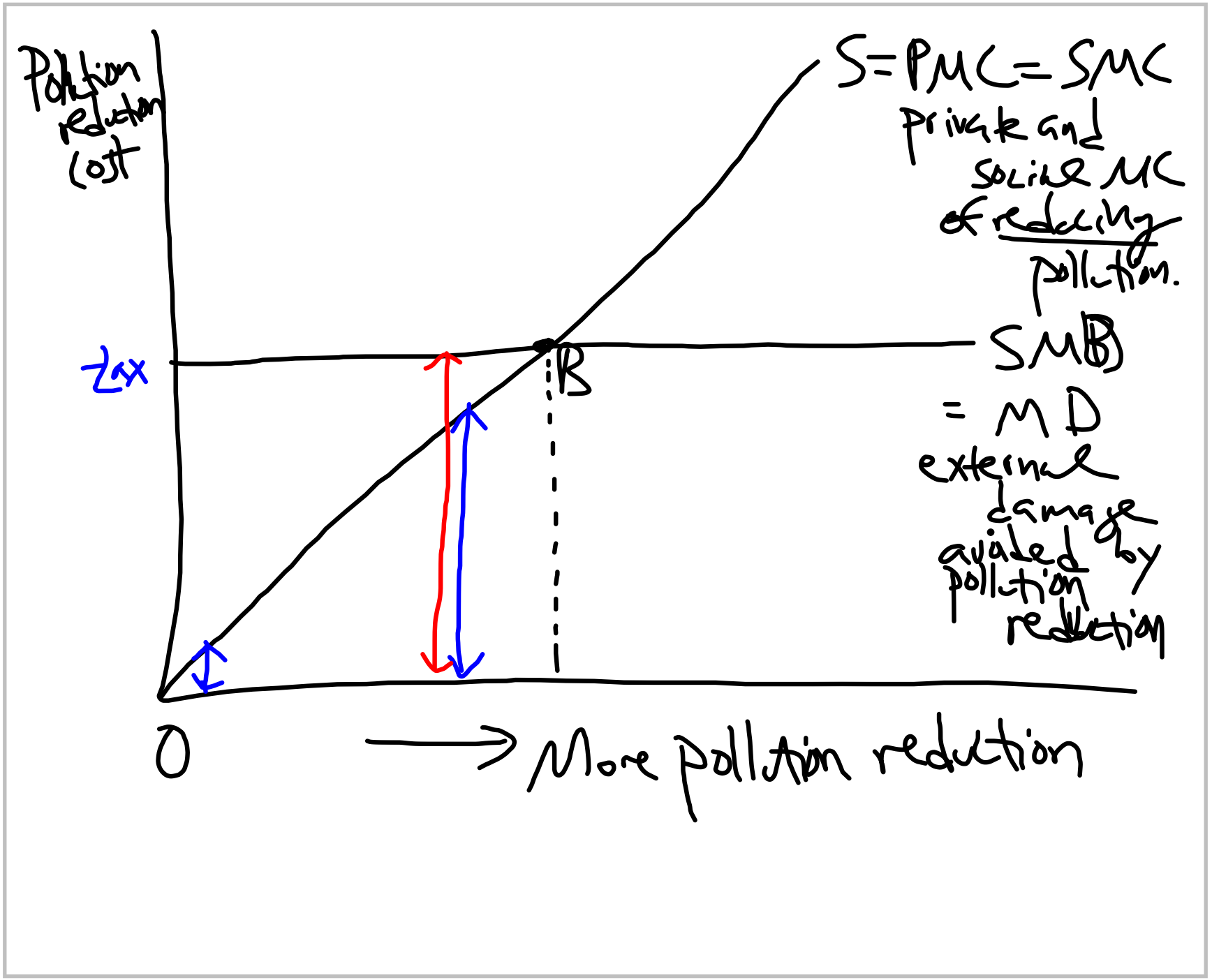
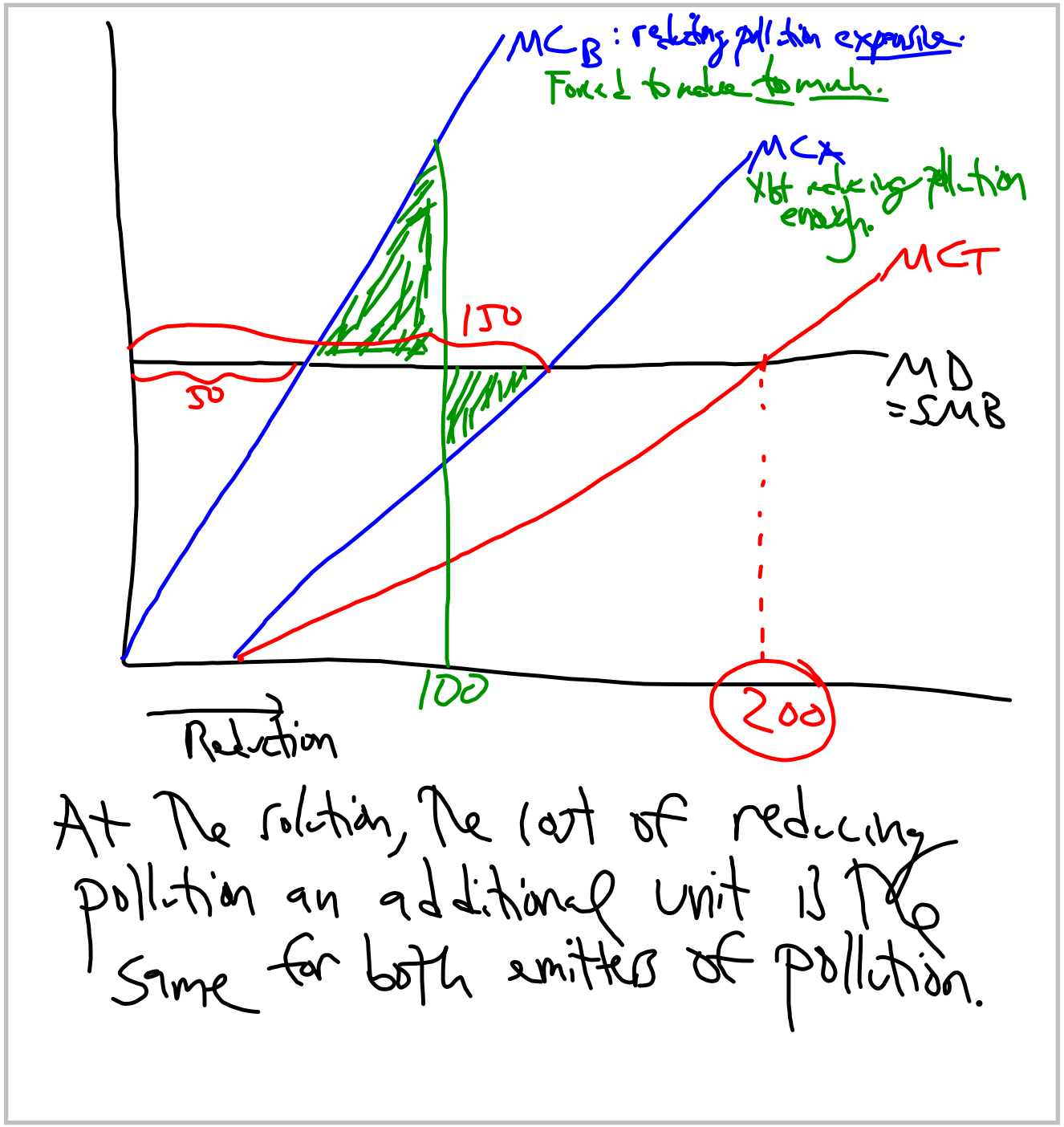
Lecture 7

The thought experiment is: the firm is producing and polluting, then it is told it must (a) pay a tax per unit of pollution, (b) reduce pollution by a given amount, or (c) have a permit for each unit of pollution.

Imposing a tax per unit of pollution gives the firm the following choice: keep polluting and pay the tax, or reduce pollution and save the tax. **In the graphs, the tax indicates revenue the firm saves from each unit of pollution reduction.** The MC curve indicates the cost of pollution reduction, either because the firm installs pollution reduction equipment or it reduces output. It will reduce pollution as long as the tax savings from this action exceeds the cost of this action.


Pollution reduction cost
S=PMC=SMC
private and social MC of reducing pollution.
SMB
= MD external damage avoided by pollution reduction
Tax
B
0
More pollution reduction



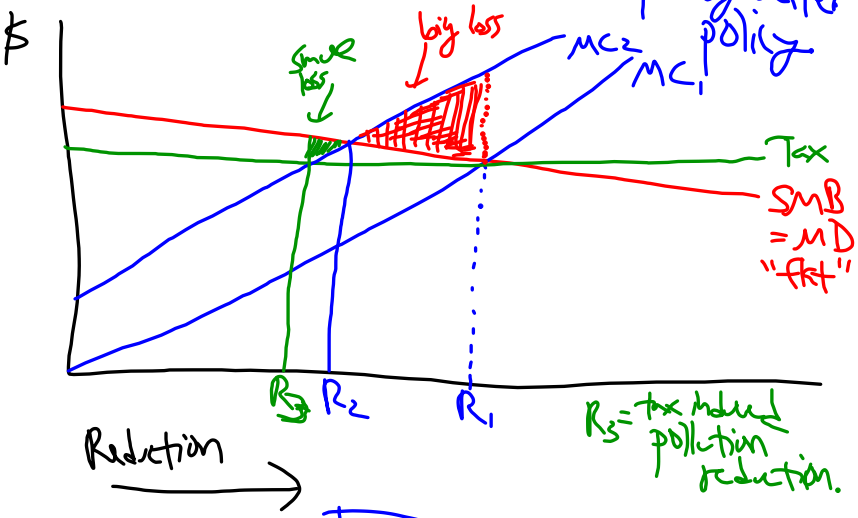
At the solution, the cost of reducing pollution an additional unit is the same for both emitters of pollution.

Suppose government has incorrect information about cost of pollution reduction; it thinks the costs are lower than they really are.

① Global warming: social marginal benefit of pollution reduction is small.

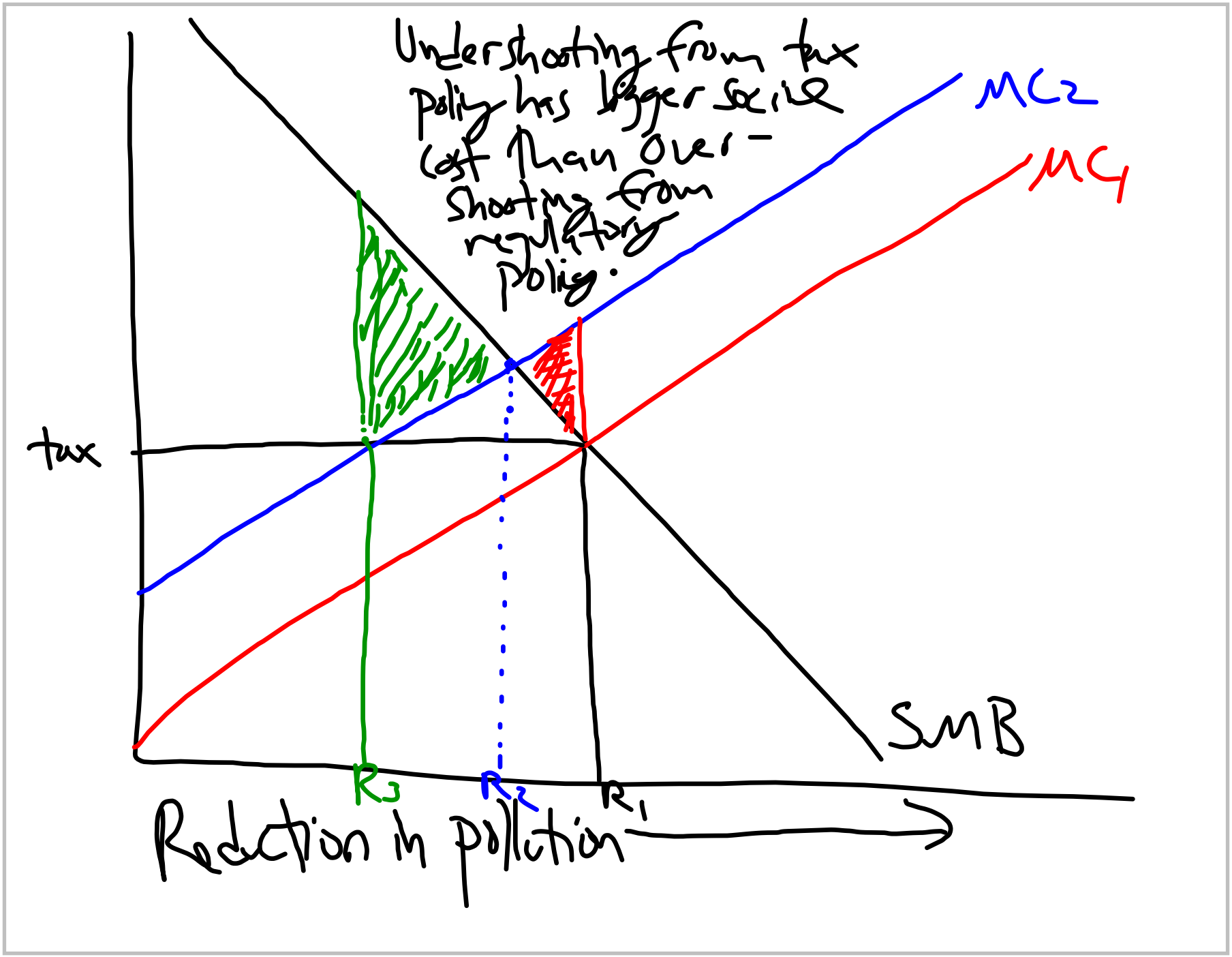
② Nuclear leakage: "" "" is large.

Quantity type restrictions probably better policy



MC_1 = what gov't thinks cost to firms of pollution reduction is.

R_2 = true optimal pollution reduction. Also, MC_2 determines what firms do.



Title: Feb 6 - 1:51 PM (4 of 5)

Quantity Regulation with Trading

The example from Chapter 6 is the cap and trade system in the Kyoto treaty.

The goal is to achieve a total reduction in carbon emissions of 630. This number is specified by the treaty. Under the treaty, the US has an obligation to reduce carbon emissions by 440 (million metric tons) and the rest of the world by 190. However, any country can reduce carbon emissions by less if it obtains permits to pollute.

Specifically, for the US:

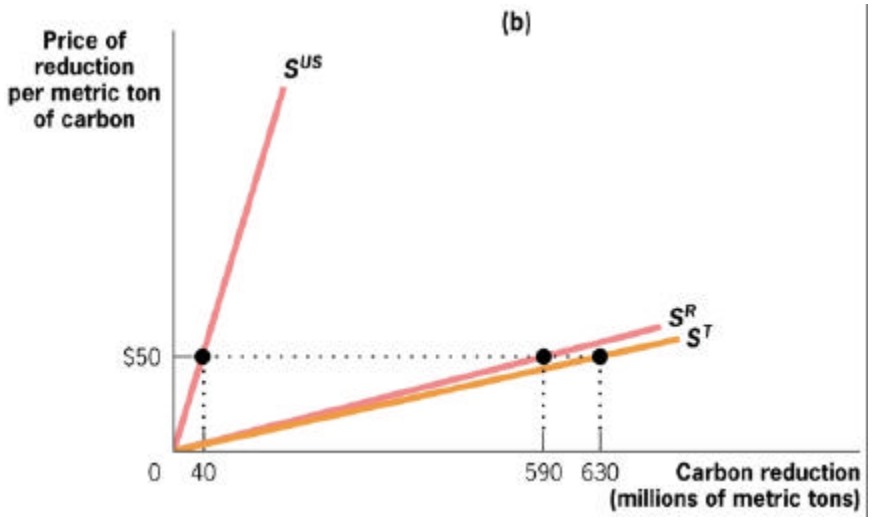
Pollution reduction + Permits to pollute = 440

(Notice: the US only needs permits for the excess of its required pollution reduction over its actual pollution reduction. It does *not* need permits for all of its pollution. This point may not be well understood.)

For the rest of the world:

Pollution reduction + Permits to pollute = 190

The market clearing price of a permit is $50: at this price, the US prefers to reduce pollution by just 40 units and buy the remaining 400 permits it needs from the rest of the world, and the rest of the world reduces pollution by 590 units and sells 400 permits to the US.



The US finds it cheapest to make the first 40 units of its quota by reducing pollution and the remaining 400 units by buying permits.