Price as a Regulatory Instrument for Climate Change

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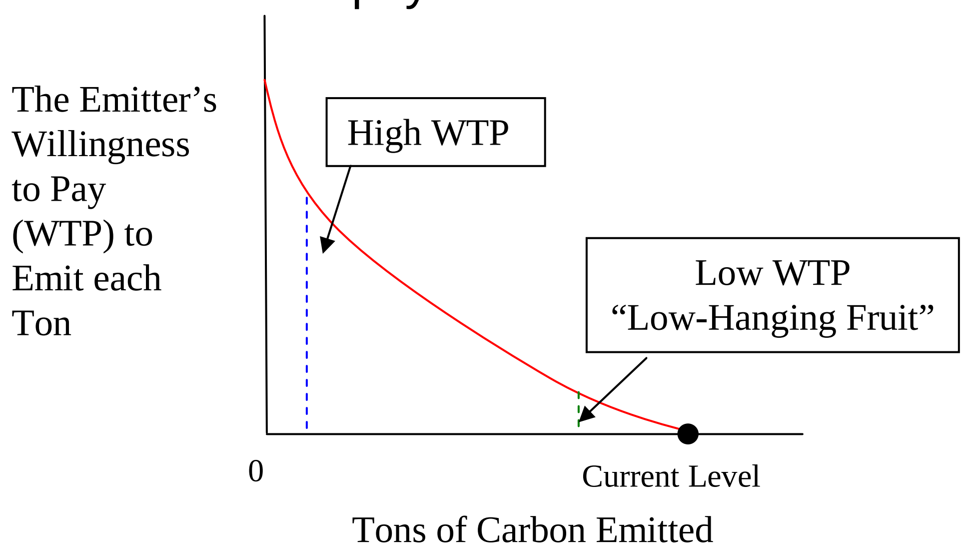
Some Emissions are Costly to Reduce, Others not so Costly

The height of the red line shows the cost of reducing each ton, or the emitter’s maximum willingness to pay in order to emit it

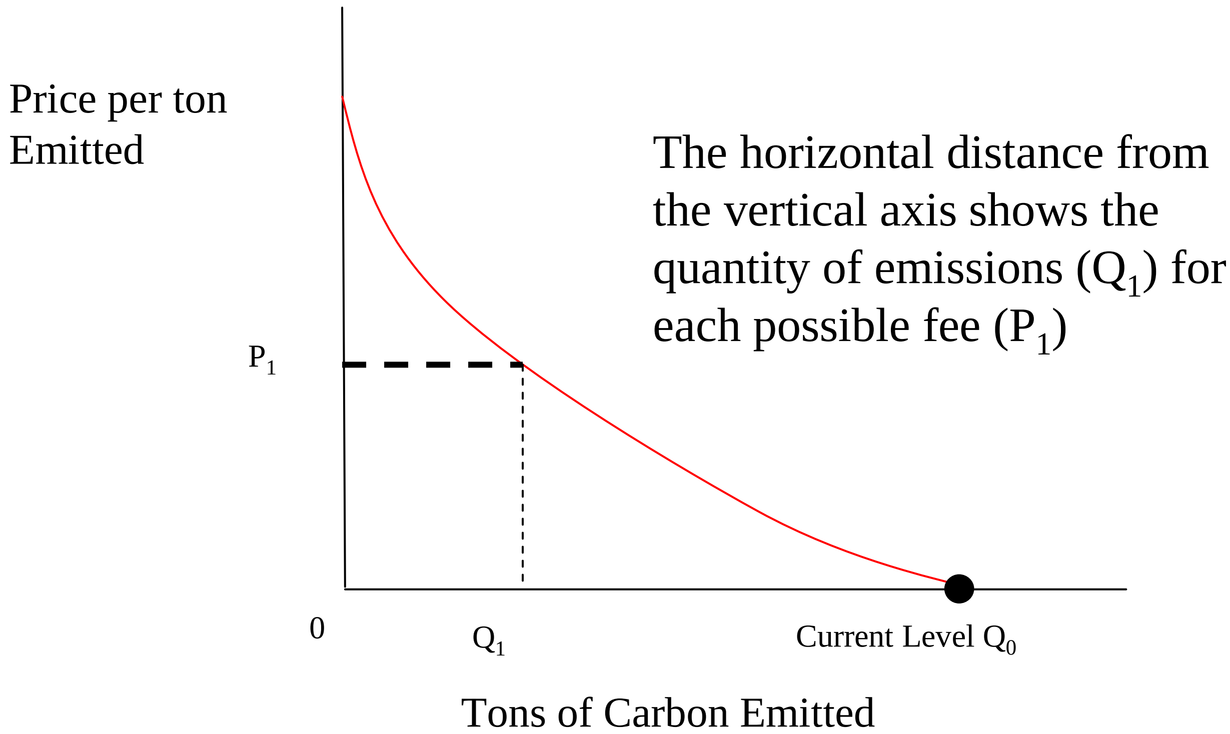


Emissions arise from a myriad of circumstances

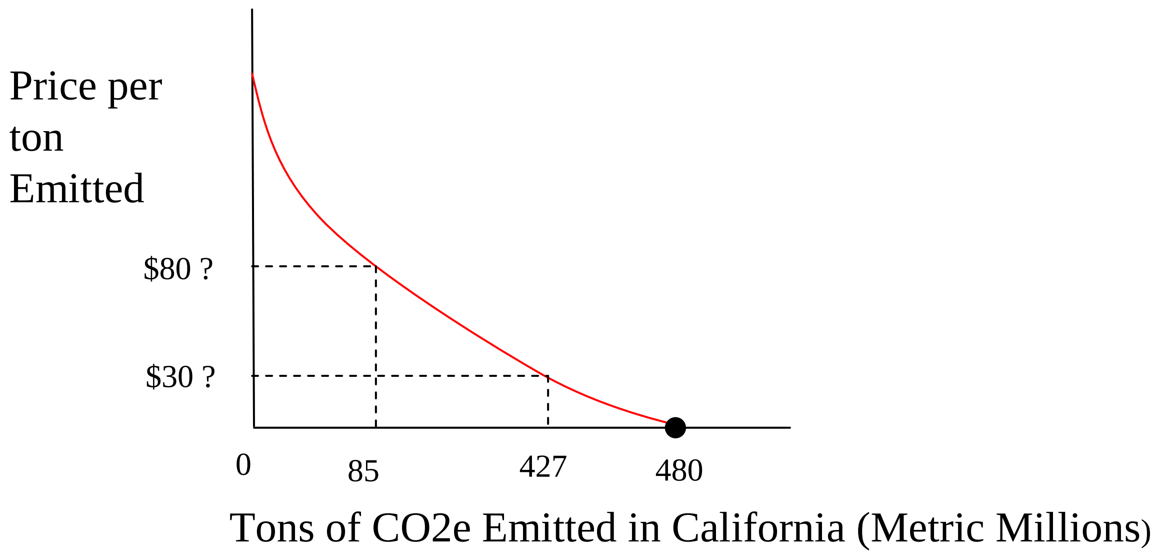
- Examples of high-hanging fruit: a coal-fired electricity plant that can only reduce emissions by expensive sequestration; trucking or bus companies who own large fleets of last year’s inefficient gas guzzlers; refrigerators that rely on fossil-fuel fired electricity sources; the travelling salesman who needs to carry his samples in a motor vehicle.
- Examples of low-hanging fruit: the car commuter who can easily be induced to take mass transit or to buy a new energy-efficient Prius; firms and consumers that can be easily induced to replace conventional bulbs with compact fluorescents.
- Each of us, whether acting as consumers or in our businesses, probably causes some emissions that are “low-hanging fruit” (easy for us to reduce) and other emissions that are “high-hanging fruit” (hard for us to reduce).
- We can reduce emissions both by technology (a better car or light bulb) and by behavior (reduced driving, less use of air-conditioning)

If Carbon Emissions are Priced, This Same Curve is Also a Demand Curve for Emitting Carbon

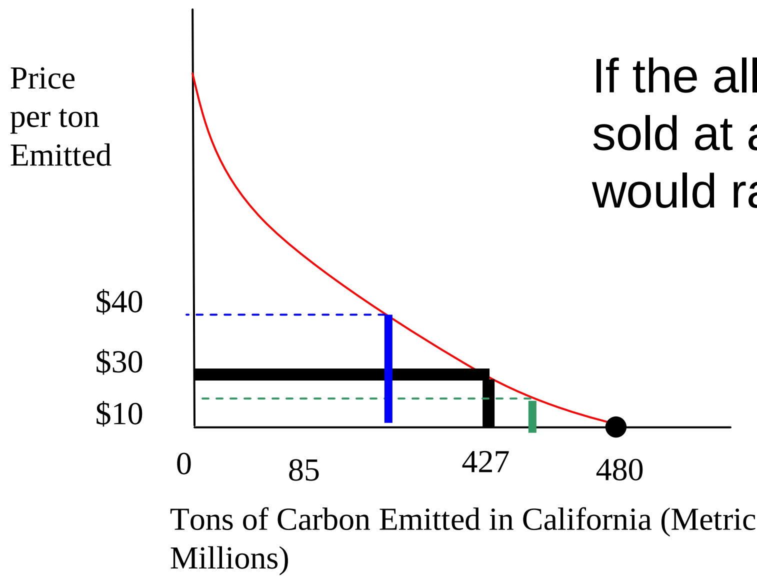
The regulator cannot know which of all emissions are low-hanging and which are high-hanging. But the regulator can charge for emissions, and let individuals and firms decide for themselves. The reductions are achieved at the least possible total cost.



Based on Current Technology, Guesstimates of the Fee Rates Necessary to Achieve the 2020 and 2050 Emissions Reduction Goals

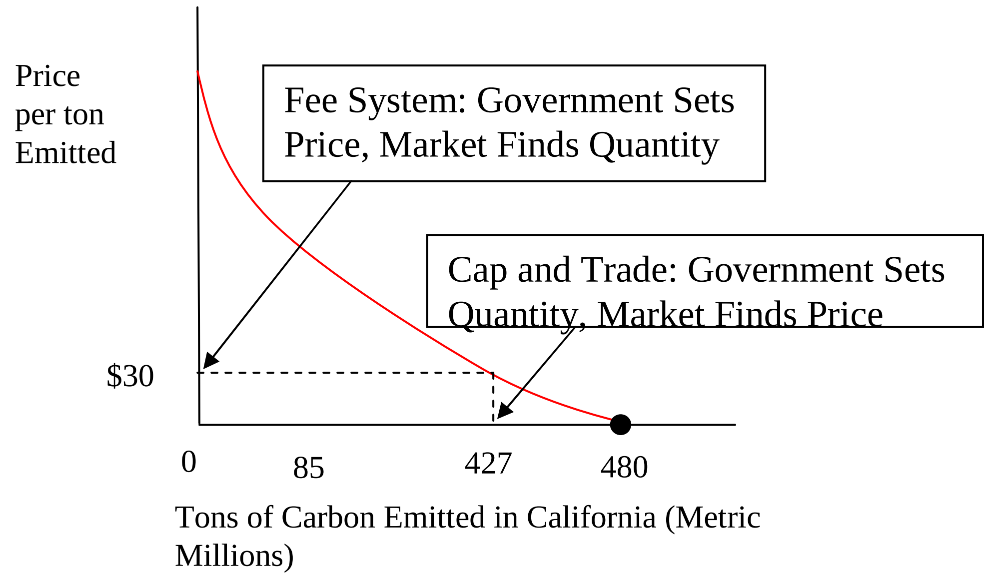


A Cap-and-Trade Program
Trading Opportunities after the Initial Allowance Distribution
[Green = seller and Blue = buyer]



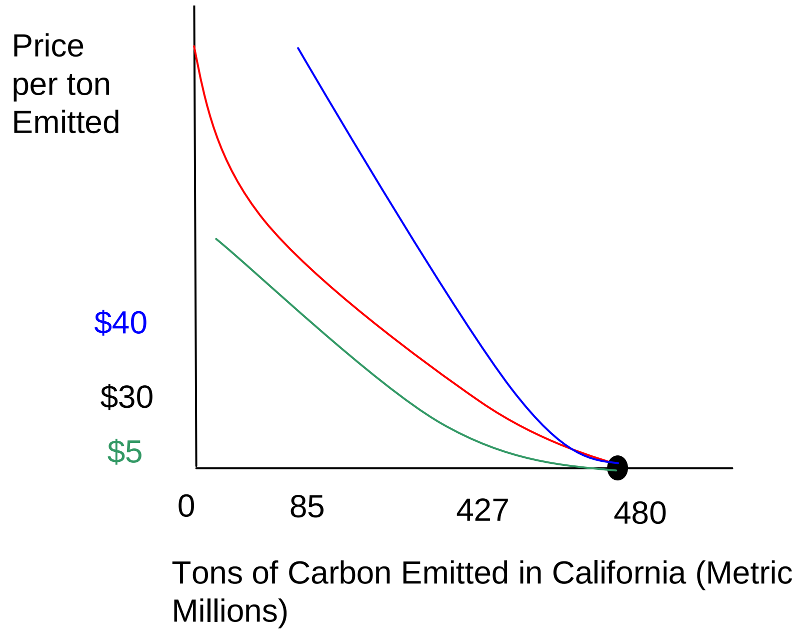
If the allowances were sold at auction, the state would raise $14.4 billion

Fee Approach: Government Sets Price
Cap-and-Trade: Government Sets Quantity



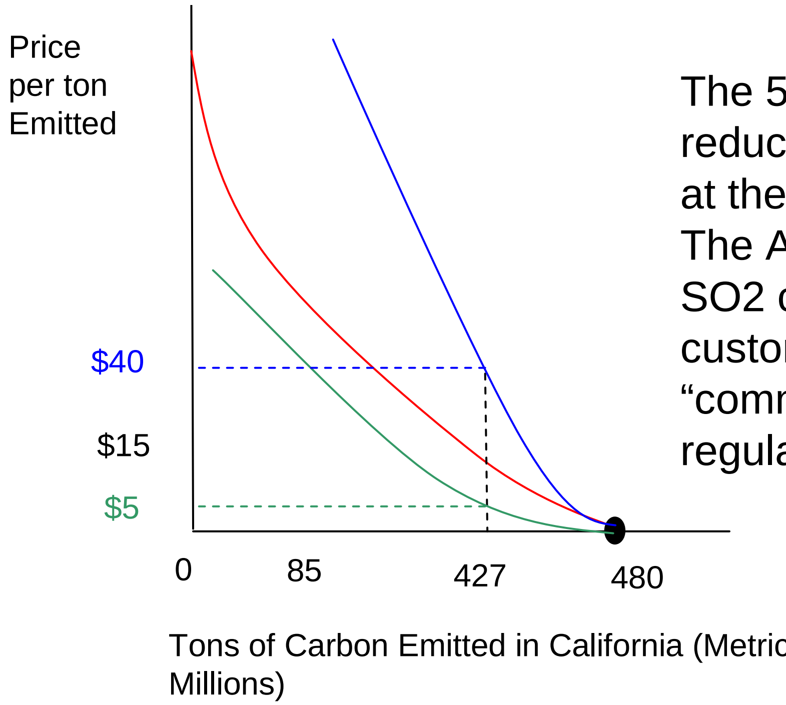
We Don't Know where the Red line is Located.

Suppose All We Know is that the True Emissions Demand Curve is Between the Blue and Green Lines



Cap-and-trade has Price Uncertainty

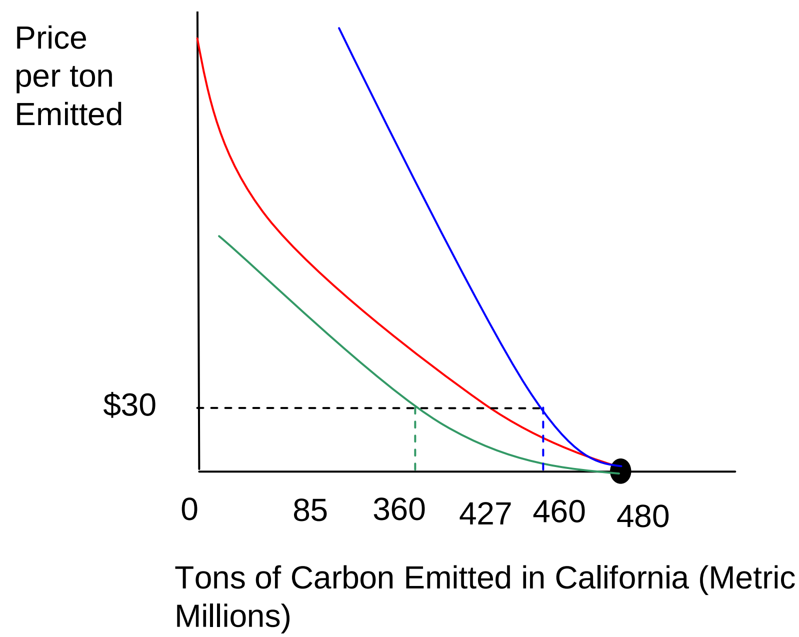
If we set a cap at 427, allowances prices will be somewhere between $5 and $40 per mmt.



The 53 mmt emissions reductions are still achieved at the least possible cost. The Acid Rain program for SO2 costs firms and their customers 33-50% less than "command and control" type regulation.

The Carbon Fee has Quantity Uncertainty

If we set a fee at $30 per mt, the amount of emissions will be somewhere between 360 and 460 mmts.



Carbon Emissions Pricing Is a Long-Term Process

Alternative Time Paths to Meet State Emission Reduction Goals

Millions Metric Tons

Year	Emissions (Linear)	Emissions (Constant Depreciation)
	-13.75/yr., -11.4/yr.	2.82%/yr., 5.24%/yr.
2012	**537**	**537**
2015	496	493
2020	**427**	**427**
2025	370	326
2030	313	249
2035	256	191
2040	199	146
2045	142	111
2050	**85**	**85**
2055	28	65

The Main Short-Run Uncertainty is in Getting Started, Not from Year-to-Year once Started

EU ETS Allowances by Year of Issue	Price in Euros as of 5/08
Dec 2008	26.06
Dec 2009	26.68
Dec 2010	27.41
Dec 2011	28.10
Dec 2012	29.08

Long-Run Uncertainty is Due to Technological Progress and New Scientific Understandings of Climate Change.

Emissions Pricing will cause Technological Progress, and Technological Progress will affect Emissions Prices

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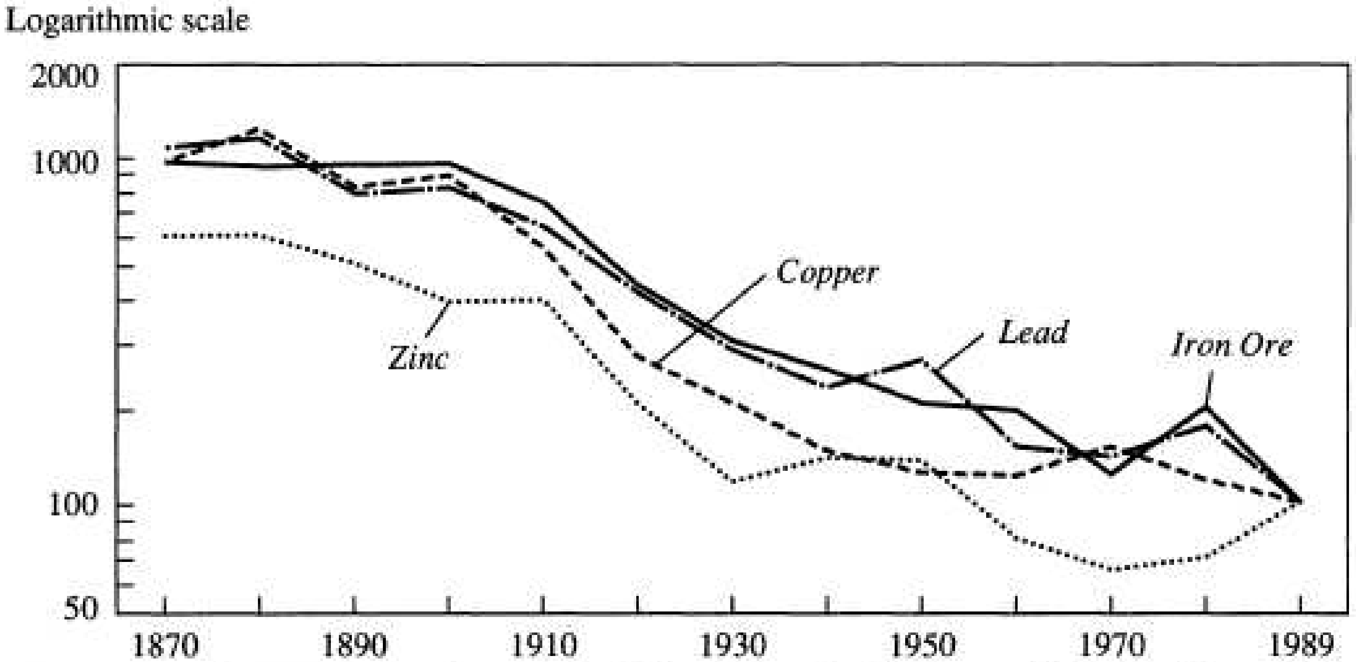
Figure 3. Real Prices of Major Minerals in the United States, 1870–1989

Real price index, 1989 = 100



Source: Author's calculations based on Manthy (1978, p. 114); *Statistical Abstract of the United States, 1991* (table 669, p. 408, table 1221, p. 698, and table 1241, p. 707); and U.S. Bureau of the Census (1975, pp. 165, 169–70, 599, and 602–03). Real price is an index of the product price divided by an index of average hourly earnings in manufacturing.