# Section Exercise for February 24/25: Externalities

A standard 42-gallon barrel of West Texas Intermediate oil sold at the standard contract reference delivery point of Cushing, Oklahoma in August 2014 for $100/barrel. By February 2016 the price was down to $30/barrel.

The long-run demand curve for oil, in billions of barrels/year and $/barrel, is currently given by:

$P = 400 - 10Q$

In the short run, as systems and industries adjust, demand will be different. The long-run demand is what demand will be if the price stays the same and the economy fully adjusts.

1) What was the long-run quantity demanded of oil back in August of 2014? What is the long-run quantity demanded of oil today?

2) Current estimates are that the additional global warming from burning an extra barrel of oil and thus turning its carbon into atmospheric carbon dioxide is some $10/barrel. How much additional environmental harm will be done if the oil-using sector is in its long-run equilibrium corresponding to $30/barrel rather than $100/barrel?

3) What is the optimal Pigovian tax to impose on oil in order to force the market to make the right decisions as to how to trade-off the usefulness of carbon energy in the present versus the dangers of global warming in the future?

4) By how much would the optimal Pigovian tax on this pollution externality reduce long-run oil consumption?

5) At a price of $100 a barrel, what is the total consumer surplus generated in the oil-using sector?

6) At a price of $30 a barrel of oil, what is the total consumer surplus generated in the oil using sector?

7) Assume that (a) we do not care about how much producer surplus is generated in the oil sector, and (b) that the recent collapse in oil prices is a permanent shift that will be sustained. Is the collapse in oil prices good news or bad news? How good (or bad) is it as news? And for whom is it good or bad news?

8) How would you adapt your analysis to take account of the fact that estimates of the costs of global warming in the future are highly uncertain—that they might be much larger than $10/barrel, and might be much lower?