

QUANTITATIVE METHODS IN PUBLIC POLICY

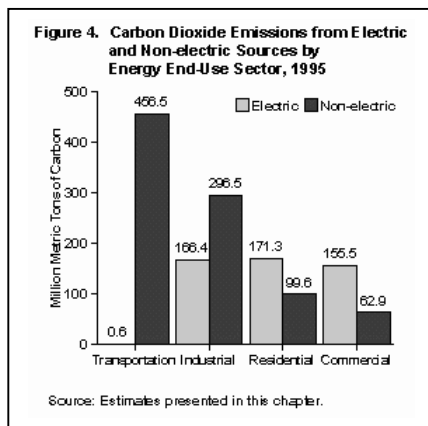
Spring 2005

ASSIGNMENT #3 – February 17, 2005

TRADEOFFS

Reducing Greenhouse Gases

Suppose our goal is to reduce the emission of carbon dioxide (CO₂), the main contributor to global warming, by 20%. Under the most optimistic projections, targeting the emission of CO₂ by automobiles will not reduce CO₂ emissions by more than 10%. Therefore, achieving the last 10% reduction in emissions will require changes in the way electricity is produced.



Source: *Emissions of Greenhouse Gases in the United States 1995*, U.S. Department of Energy.

1. Look at the chart on the left. What percentage of CO₂ emissions come from the production of electricity?
2. If we want to reduce total CO₂ emissions by an additional 10% (above the gains achieved in the transportation sector), by what percentage will we need to reduce CO₂ emissions from electric sources?

About 63% of the world's electricity is produced with fossil fuels (coal, oil or natural gas). Generating electricity in this way causes substantial amounts of CO₂ to be emitted. However, there are a number of ways to reduce the emission of CO₂ from electric sources. Three of the most commonly suggested methods are:

- **Hydro Electric.** Hydro electric plants use the flow of water from dams or reservoirs to generate electricity. This process emits no CO₂. Substituting hydro electric for coal, oil or gas produced electricity could reduce greenhouse gases without causing a drop in the total amount of electricity produced.
- **Nuclear.** Nuclear reactors typically change the heat from nuclear fission into steam and then into electricity. Like hydro electric power, this process emits no CO₂ and could replace other forms of electricity production.

- *Conservation.* Rather than substituting hydro electric or nuclear sources of electricity for fossil fuel sources, we could reduce greenhouse gases simply by reducing the amount of electricity we use.

3. We could reach our targeted level of CO₂ emissions through any of these methods, but which method is the best? Rank these three methods, from best to worst, according to each of the following criteria (you should have four sets of rankings). Briefly justify your rankings (you may be required to do a little outside research).
 - Harm caused to the environment (other than global warming).
 - Safety.
 - Cost.
 - Effect on the economy.
4. Based on these rankings, can you determine which method of reducing CO₂ emissions is the best way to reach our goal? Can you rule out any methods? Explain.
5. On first blush, wind power seems like a panacea. The process of producing electricity by wind emits no CO₂. Wind is renewable and, aside from complaints about noise and a danger to birds and bats, there does not appear to be any negative environmental consequences from wind power. So why isn't more electricity produced from the wind? Do some research and identify the tradeoffs that might explain why wind power has not become the dominant form of electricity production.

Reducing Illegal Immigration

One way to reduce the number of illegal immigrants is to stop them at the borders. Another way is to reduce the incentives for them to enter the country. Laws prohibiting employers from hiring illegal immigrants are intended to do the latter, but these rules merely require employers to ask for evidence of legal residency. There is no obligation on the part of the employer to verify the information supplied by the employee, so if a potential worker gives the employer a false social security number the worker will usually be hired.

Some people have suggested requiring employers to verify the legitimacy of the information provided them by potential employees. If illegal immigrants were unable to falsify proof of legal residency they would be unable to work in this country, and the number of people entering the U.S. illegally would probably fall dramatically. On the other hand, requiring employers to verify social security numbers or other evidence of legal status may have its own drawbacks.

6. Clearly identify the tradeoffs in this debate and discuss how you would go about resolving these tradeoffs.