

Miscellaneous Points on Sources, Style and Assumptions

- 1) There is no such thing as half a suspension bridge. Sometimes we have had to look forward to future chapters to calculate what is happening in current chapters. (If you remember high school algebra, you could think of this as solving simultaneous equations.)
- 2) I try to use gender neutral language whenever possible; but sometimes I find it unbearably awkward. When that happens I use “she”, “her” and “woman” as generic terms referring to both male and female humans.
- 3) Discount rates are a reflection of the fact that even an absolutely iron-clad guarantee of one hundred dollars a year for ten years is not worth the same as one thousand dollars today. (At a 6.5% discount rate, that cash flow is worth a bit less than \$719.) By an odd coincidence, 6.5% is the discount rate used throughout this bookⁱ.
- 4) A lot of the proposals are already being carried out to some extent; that does not invalidate the fact that if carried through completely they can save or produce a great deal of energy. What we need to exceed is not our best current operating procedures, but our current average efficiency. If comprehensive adaptation of a widely used technique can raise that average high enough, then so much the better.
- 5) If you are reading this in one of the rich nations other than the U.S. you may notice that a number of recommendations are routinely followed already where you live; the reality is that in many sectors the U.S. has fallen technologically behind the rest of the rich world.

ⁱ Many bottom-up energy studies use extremely high discount rates - commonly 30% and up. This is because the people making these studies are focused on what the industries involved can be coaxed into doing either through simple persuasion, or through very mild tax incentives and regulations. There are various reasons industry demands such high rates of return on energy savings, which we will delve into after the technical sections.

It is tempting to go to the opposite extreme, and use the social discount rate, (the rate of growth in the economy). This is typically around 3 or 4 percent. After all, to the extent that capital as a whole (not individual firms, but all firms put together) earn a real rate of return greater than economic growth it must be extracted from somewhere else within the economy. I give an example on the next page that, for 80% of us, real wages have been frozen in the U.S. since 1968, while the per capita economy nearly doubled³. So using a social discount rate would make a great deal of sense.

But our definition of "zero cost" precludes this. We are going to bundle measures we predict to save less than our discount rate together with measures we predict to save more. We will start with savings exceeding our discount rate; then we will use that savings to pay for expensive renewable supplies - ending up with zero market cost compared to current trends or a bit less. With this kind of juggling we have to build in some risk premium as a margin of error. We will not end up with a return exceeding our discount rate by much; very small miscalculations could lead to yields that are lower. Mainstream social discounts hover around 5%. As a precaution, we will use a real discount rate of 6.5% - substantially higher than most variable mortgage rates as of the time of writing this book. It should be no lower than those rates even if they rise by the time it is published. Given that risks in energy saving investments are substantially lower in risk than private-mortgages backed bonds, that energy prices tend to keep up with inflation, and that greenhouse gas reducing investments have tremendous social benefits, this is still a conservative choice.

- 6) I use a variety of types of sources in this book; but I think if you pay attention to the type of information being documented you will find the sources appropriate. For example I get statistical information from large governmental or quasi-governmental agencies, or major think tanks, non-profits and academic and professional sources respected across the political spectrum. For cost averages (and comparable points), I sometimes use respected commercial sources or trade associations. For examples, and specific data points (such as the per square foot cost of a particular house) I will sometimes use general periodicals such as the NY Times.
- 7) I will occasionally cite advertising, partisan or viewpoint organizations or other highly biased, not necessarily respected sources in certain circumstances:
 - a. For data where they would be the best source – for example price quotes from manufacturers or distributors
 - b. Concessions that go against their bias, especially if reinforced by a respected source
 - c. For quotation, when they make a point in an especially articulate or well reasoned way – though in such cases I always try to document the facts behind their argument from other sources.
- 8) Whenever possible I provide a URL to make cites easier to check, though of course a high percentage will have expired or become otherwise obsolete. When this happens Google is your friend. So are libraries.
- 9) I'm using a personal variation on end-of-manuscript Chicago style endnotes. Instead of dividing them into sections corresponding to chapters, and restarting numbering in each section, I simply number them consecutively from beginning to end. That way, when skipping past other notes to find the one you are searching for, it is always obvious approximately how far away your goal is.