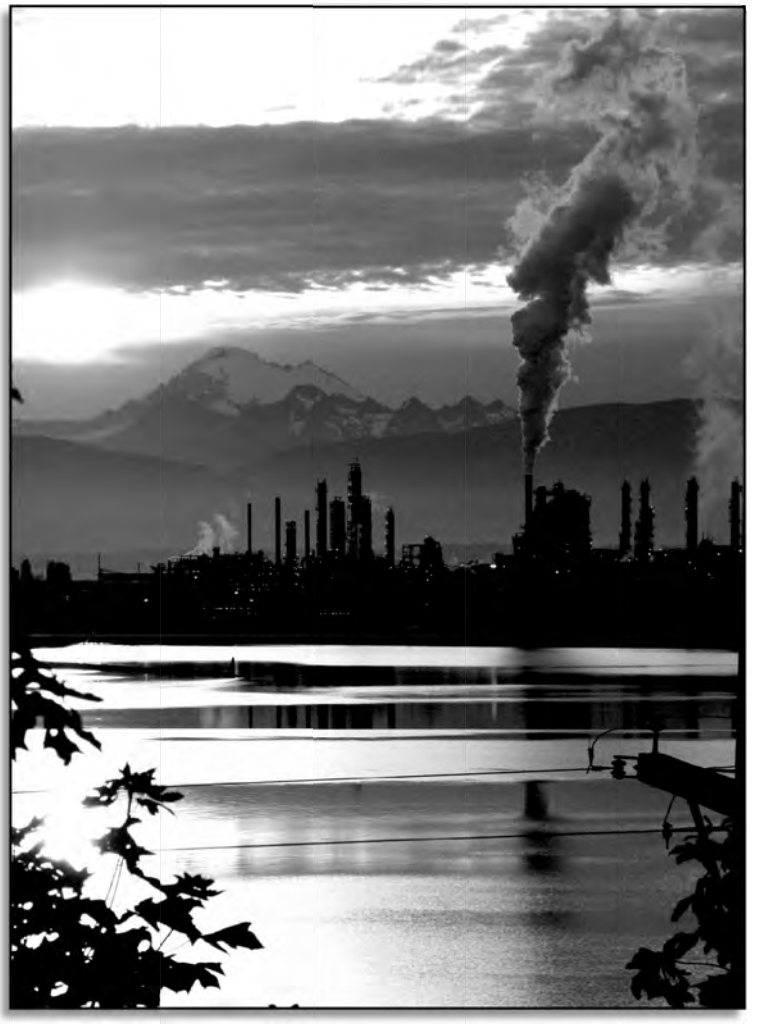

My sunrise photograph is of the two refineries in Anacortes, Washington, with Mount Baker in the background near the Canadian border. The refineries consume 255,000 barrels of Alaskan crude oil per day, delivered by supertankers, and produce gasoline, propane, and diesel fuels.

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Cleaning Up Our Act

> Time is short and the prospect of even partial success remains uncertain. Yet we can avoid catastrophe by mobilizing our ingenuity and community spirit.
>
> Addressing global warming will require less sacrifice than defeating fascism and communism, but more foresight—and that is exactly what we have been acquiring. If humanity's track record with long-term problems shows mostly indifference and failure, that need not set a precedent for our future.
>
> —historian of science Spencer Weart, 2007

I am often asked whether I think we're up to acting on climate in the United States, given that the glaciers in Greenland are moving faster than our politicians.

The tone of the question is usually pessimistic, but my answer is not. I can imagine scenarios that might prove effective, given some political geniuses rising to the challenge.

I reply that even the best governments find it difficult to handle problems that require a lot of expert opinion to be

translated into appropriate action with major economic consequences. Still, there are success stories.

The U.S. Congress has, in the past, created commissions to which they have delegated some of their powers. A non-technical example is the commission for closing military bases. This is a delegation of powers which saves a senator or representative from being directly linked with the loss of a big payroll back home. But I'm thinking more of the long-standing commissions requiring expertise, professionalism and experience, where debate, discussion, and deliberation are tempered by the oversight that a functioning democracy expects and demands.

For example, the Securities and Exchange Commission makes rules that promote transparency. While this is more about managing the playing field than it is the stuff of science and technology, little would get done if Congress hadn't handed off some of its powers. The Federal Communication Commission is similar but more technical (just imagine Congress trying to deal with spread-spectrum frequency allocations).

The Federal Reserve Board is the best-known and, as Stanford climate scientist Stephen H. Schneider has noted, the most relevant model for action on climate. Not only does "the Fed" save the Congress from having to vote every three months on unpopular issues like raising interest rates, but it brings economic expertise to matters that go beyond what wisdom Congress might collectively possess on the subject.

> In theory, you could design a tax and rebate system [which, though it] would be no harder to implement than a rationing system, it would, because of the complex system of fees and rebates, be more difficult to explain. Complex ideas seldom do well in politics, as most people do not have the time or patience required to understand them. We are likely to react against one part of the package before we have grasped the whole idea.
>
> —commentator George Monbiot, 2006

In the U.S., it is clearly time for Congress to institute European-style fossil carbon taxes while reducing other taxes to compensate people for paying higher fuel bills. (Cap-and-trade will raise prices without a reduction elsewhere.)

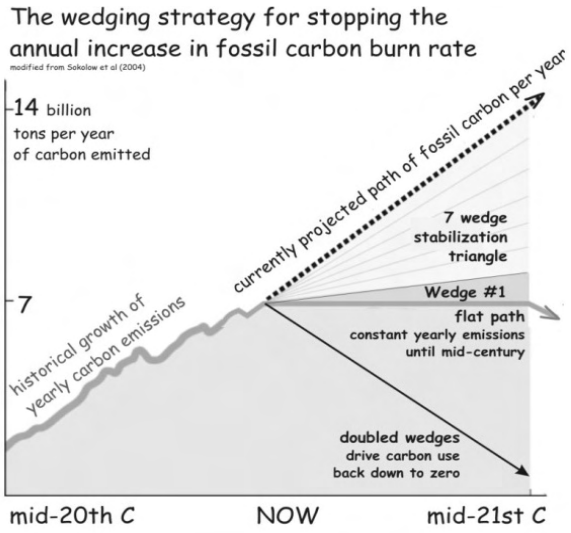
At present, there is little that the average person can do to reduce their exposure to U.S. taxes. I like Al Gore's notion of eliminating payroll taxes (social security/-Medicare and unemployment; they're the biggest part of withholding for most people) when a carbon fee kicks in to put a price on pollution. This is really clever social engineering, not mere tax relief. Presently there are few ways to game the system and pay less taxes than your neighbor. But with the C-fee (a better phrase than carbon tax) in place, then a more efficient car, better insulation, and car-pooling work like tax credits, not deductions. People love to game the system and the prospects of reducing their total taxes by a third will bring out all sorts of creativity that will reduce carbon emissions and grow more C-sinks.

Second, it's time to delegate substantial rule-making power to an expert commission for climate policy. For

example, the Federal Carbon Board might adjust carbon tax rates and emission caps to ensure that national CO_2 and smog goals are met, just as the Federal Reserve Board now adjusts the mortgage and credit card interest rates to ensure that inflation and unemployment targets are met.

Third, we'll need a Carbon "Makeover" Commission to mandate more efficient cars, trucks, planes, buildings, appliances, and manufacturing processes. Some of the C-fee money needs to support the development of the longer-term technologies, things that no company can currently undertake while remaining competitive. The commissioners will also need to quickly build demonstration projects such as geothermal plants (more in Chapter Nineteen). They will need to make sure that oil and coal companies do not buy up the alternative fuel companies and then sit on their innovative patents until the clock runs out. This makeover opportunity offers the largest, cheapest, and fastest leverage on carbon emissions—which is why Congress cannot be left to deal with it, piece by piece.

Fossil fuel use has been growing annually and, if it continues to grow at the same rate (rather than even faster), it will double worldwide before midcentury. The Carbon Initiative researchers at Princeton show what it will take to replace this growth by dividing the efficiency and replacement problem into seven areas. Each "Princeton wedge" is assumed to improve fast enough to replace 1 billion tons per year by midcentury.



For example, wedge #1 might come from doubling gasoline mileage, #2 from reducing distances driven by half. Replacing all incandescent light bulbs in the world with compact fluorescents might provide one-fourth of a wedge. One or more wedges might come from increased use of geothermal and nuclear power plants, and so forth.

This framework has no actual reduction of carbon emissions until after midcentury—and stopping the annual increase in carbon emissions (which is all it addresses) is a long way from stopping the increase in CO_2, or the main thing, actually removing the damaging CO_2 from the air. Stopping emissions growth represents the most minimal of do-something responses. But the exercise is useful because it creates a way to "compare apples and oranges."

In my opinion, we cannot afford to proceed so slowly. But even a doubled wedge doesn't actually reduce the CO_2 in the atmosphere, only the rate of its increase. Nor does the wedging strategy provide a safety margin for, say, regional failures to participate—or a big double-duration El Niño whose fires bump up the CO_2 and therefore the global temperature.

> Avoiding temperature increases greater than 2–2.5°C would require very rapid success in reducing emissions of methane and black soot worldwide, and global carbon dioxide emissions must level off by 2015 or 2020 at not much above their current amount, before beginning a decline to no more than a third of that level by 2100.
>
> —the UN's Scientific Expert Group on Climate Change and Sustainable Development, 2007

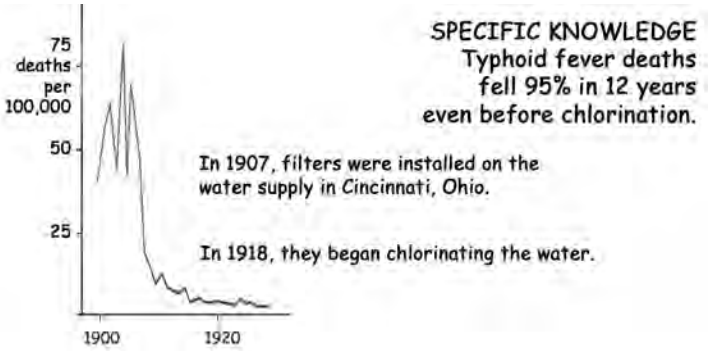
Carbon reductions take a long time to show up because the CO_2 from every supertanker and coal train stays in the atmosphere for centuries. The other contributors to global fever can, when reduced, show an effect more promptly, suggesting major efforts ought to be directed at them in light of the deadline of 2020.

The world's anthropogenic methane comes from energy systems and livestock (each about 30 percent), 25 percent from agriculture, and another 15 percent from landfills and waste treatment. That's good news in the sense that technology can reduce all of them. Methane's relatively short atmospheric lifetime, 12 years, means that improvements translate quickly into reduced concentrations and reduced global fever.

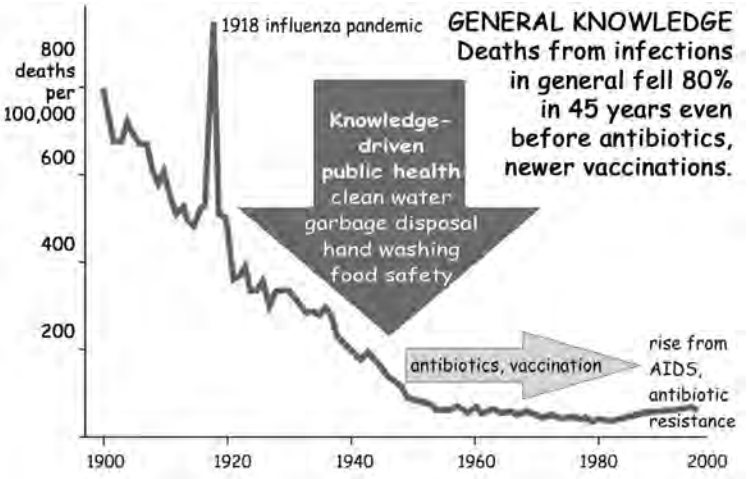
The soot that warms the atmosphere comes from the old two-stroke engines and the common diesel engines, as well as from traditional burning of wood and dung, agricultural burning, and forest fires. The emissions from engines and biomass fuels can be sharply reduced by technical means. The short atmospheric lifetime of soot (days to weeks) means that reducing it has immediate effects on global fever and restoring the rainfall downwind.

The goal for 2020 is to stop the expansion of fossil fuel use, which some call "stabilizing" emissions. That word sounds good, until you discover how minimal it is. "Stabilizing the patient" is what you do in the emergency room to keep the patient from crashing for good; it only buys time for more definitive treatment in the operating room. Even if we stop the growth, we'd still be adding a constant amount of fossil carbon to the atmosphere each year. Stopping that before 2040 would be my second goal. Cleaning up the accumulated excess by 2080 would restore the CO_2 concentrations to what they were in 1939 and reverse many of the climate changes.

If we don't start thinking big about the CO_2 problem, we may miss our opportunity to stop a climate runaway that will trash the habitable parts of the earth. We used to be able to say, "If you can't stand the heat, get out of the kitchen." But it's not going to be practical to get off our only habitable planet.



Since there is a lot of climate science left to be discovered, one source for optimism comes from the analogy to how things went in medical science when it was in a comparable stage of development. A lot can be done with inexpensive technology once you understand how things work.



William H. Calvin, GLOBAL FEVER (University of Chicago Press, 2008)

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WILLIAM H. CALVIN

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