The Gist of Bill Gates' book (2021), *How to Avoid a Climate Disaster*

Outlined
(with praise and criticisms)
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Bill Gates has a soul (like other good people), and a better brain than most of us, and plenty of diligence. His book is brilliant, but if you don't have time to read it, or if getting a copy is hard for you, then try this outline by me of how he sees the problem and the feasible (he hopes) solutions to it.

He and his wife Melinda collaborate on public-health issues like nutrition and epidemics, but this book on preventing a climate disaster is all his own. His proposed solutions are technocratic; he doesn't try, as Gandhi did, to get people to behave much better and to be satisfied with poverty. It doesn't inspire him – it only distresses him – to see a student studying by candlelight, and he wants everyone to have air-conditioning and so on as well as decent lighting. He would like lots of folks, especially poor folks, to consume energy* *more* than they do now, because he thinks (and he cites data showing statistical association) that this will make them better off; but he also wants, very much, to see a decline – all the way down to zero by the year 2050 – in the worldwide rate of using the particular kinds of energy that are causing global warming. Why *zero* rate? He explains that it's like preventing a plugged-up bathtub from overflowing because of a dripping faucet. To get

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*He means exergy, but if I use that word you may stop reading, so I'm saying "energy" instead. For a nice explanation of the word "exergy", see https://mgmu.ac.in/wp-content/uploads/a-method-of-assessing-in-units-of-exergy-the-costs-of-depleting-the-supply-from-planet-earth-of-mineral-ores-and-fossil-fuels.pdf, pp.2-4.

the faucet to drip slower isn't good enough, the tub will still overflow and flood the house, you have to stop the dripping completely.

The rate that has to be brought down to zero is the current rate (as of *ca.* 2020) – 51 billion tons per year – of emissions (reckoned in terms of carbon-dioxide equivalents) of greenhouse gases. The first big surprise in the book is a statistical finding that making things from cement, steel etc. is responsible for nearly twice as much of that rate as transportation and travel are (cars, lorries, airplanes, cargo ships etc.). Gates has worked out, as follows, a breakdown of the total 51-billion-tons-per-year rate:

31%: "***Making things***" (cement, steel, plastic)
27%: "***Plugging in***" (electric current)
19%: "***Growing things***" (plants, animals; he means agriculture)
16%: "***Getting around***" (planes, trucks, cargo ships)
7%: "***Keeping warm and cool***" (heating, cooling, refrigeration)

Five of his chapters are about the various ways in which energy is produced for each of those five kinds of activities. In each of those chapters he's on the lookout for ***(1)*** ways that contribute to the current 51 billion tons per year of greenhouse-gas emissions and ***(2)*** "Green" alternatives, i.e. ways (of producing the necessary energy) which wouldn't do that – and not just ways already invented, but also some ways which maybe *could be* invented and developed if he and other

stinking-rich folks and governments spend vast amounts of money on the necessary research. (He knows a thing or two about technological research yielding big results.) If he thinks a certain line of research could reduce the 51 billion to 50 but could never do better than that, then he's not interested in throwing money at it; but if it could maybe later with improvements reduce the 51 to 45, then he does throw money at it. The combination of 'visionary' insights with down-to-earth quantitative thinking is a virtue of the man and of his book.

Each of those five chapters includes some sentences explaining, in very rudimentary terms as if for 9th-graders, some aspects of relevant chemical processes, and also some sentences (such as: "I've spent way more time learning about batteries than I ever would've imagined") showing that he himself has – unlike practically all the economics professors at all the universities in the world – taken the trouble to study relevant aspects of university-level chemistry. He meanwhile counterbalances his lurking chemical insights (which you can tell he has diligently bothered to gain even though he doesn't spell most of them out in the book) with financial insights tagged under the heading of "Green Premium(s)": the difference in dollars between ***(1)*** the cost of buying something produced by some technique that entails emitting greenhouse gases and ***(2)*** the cost of buying the same thing produced by an alternative technique which *doesn't* entail emitting greenhouse gases. In any particular case where the Green Premium is zero or negative, then the only hindrances to people switching over are old

habits and maybe an inherent one-time cost of making the switch. But if the Green Premium is high, than even a Mahatma Gandhi (or – let's be realistic – a Joe Biden) wouldn't be able to persuade people to switch.

Among the insights served up in this book is that it's worth asking (since we are now living in what ecological economists rightly call a geographically "full" world) how big a share of the Earth's surface this or that energy-producing technique takes up in relation to the rate of energy-flow that it yields. Which techniques are relatively efficient or inefficient in terms of watts per square metre? Here are some of his answers:

Burning fossil fuels: *500 - 10,000*
Nuclear: *500 - 1000*
Solar: *5 - 20* in reality (though up to *100* in theory)
Dams: *5 - 50*
Windmills: *1 - 2*

It seems to me that the relative inefficiency (in this regard) of solar panels can be compensated for, to a considerable extent, by putting lots of little ones on the rooftops of huts or houses. (This isn't much help, however, if you live or work in a high-rise building, i.e. with a relatively small roof in comparison to the total volume inside where you need energy for lighting, air-conditioning, lifts etc.)

In discussing nuclear-fission plants (the kind we have), Bill Gates says that the ratio between ***(1)*** the number of human deaths they have caused (e.g. by "meltdowns" such as at Chernobyl and Fukushima) and ***(2)*** how much electricity they pro-

duce has been less than 1/25th as much as the corresponding ratio re: burning petroleum (because of deadly pollution in the smoke) and less than 1/35th as much as the ratio for burning coal. (His data are: 24.6 TWh for coal, 18.4 for oil and 0.07 for nuclear.) He even uses – as Prime Minister Manmohan Singh used to do – the word "clean" to describe nuclear-fission power plants. That could prove to have been an unfortunate exaggeration, and particularly so for India, if no safe method of disposing of the radioactive waste is found.

And when Bill Gates envisages the theoretical possibility of controlled nuclear *fusion*, it seems to me that he's wearing rose-tinted glasses. He finds it "quite promising but still at least a decade away from supplying electricity to consumers". He knows that among the folks who know a lot about nuclear fusion, the nuclear scientists, there's a long-standing joke that "Fusion [in useful dosages controlled by humans] is 40 years away, and it always will be." He describes some institutions where money is being thrown at the effort (without presenting any evidence that it will succeed), and then he concludes that "the key point is not that any one company has the single breakthrough idea we need in nuclear fission or fusion. What's most important is that the world get serious once again about advancing the field of nuclear energy. It's just too promising to ignore." I think there's not going to be an avatar swooping in to save the modern world. I think the list of *partial* remedies will be long, Humankind will need Bill Gates *and* Gandhi *and* Keynes *and* … a lot of brilliant females of the species, and yet

that even so, there will be some big tragedies and no magic mountain.

At the end of the five chapters about the main kinds of activities causing global warming ("making things", "growing things", "getting around", etc.), our brilliant capitalist author promises to suggest, in three more chapters later on, some steps which he thinks "will give us [he means Humankind] the best chance of developing and deploying the tools we need" to reduce the 51-billion-tons-per year rate of greenhouse-gas production to zero per year. "But first," he says, "I want to confront a question that keeps me up at night." (You know what may be keeping *you* up at night. Have you ever wondered what keeps Bill Gates up at night?) He says: "So far, this book has been exclusively about how to lower emissions and keep the temperature[s] [where we live] from becoming unbearable. What can we do about the climate changes that are *already happening*? [my italics] And, in particular, how can we help the poorest, who have the most to lose but did the least to cause the problem?" (It's heartening to know that some of the very rich capitalists aren't zombies.) Some of the subheadings in this chapter are: "Help farmers manage the risks from more chaotic weather", "Focus on the most vulnerable people", "Factor climate change into policy decisions", "We're going to need more drinking water than we can supply" and "Finally, to fund adaptation projects, we need to unlock new money", and here he says he's thinking "not about foreign aid for developing countries – although we'll need that too – but about how

public money [he means money spent by governments] can attract private investors to get behind adaptation projects."

This chapter includes a calm discussion of some possibilities of "geoengineering" to mitigate the global warming caused by modern Humankind. The discussion mentions that "Some critics attack geoengineering as a massive experiment on the planet, though as the proponents of geoengineering point out, we're already running a massive experiment on the planet by emitting huge amounts of greenhouse gases."

One of the main arguments in the next chapter, which is entitled "Why Government Policies Matter", is that those policies ought to favour "the companies that will develop new inventions, and make sure that they reach a global scale, as well as the investors and financial markets that will back those companies". The discussion, in this chapter, of biofuels mentions that "the science of *advanced* biofuels [my italics] is just plain hard", and has got me thinking about them in a way I never did before.

The last two chapters are entitled "A Plan for Getting to Zero" and "What Each of Us Can Do", and are likewise stocked with insightful remarks. I suggested, in the first paragraph of the present pamphlet, that you read it as a substitute for reading the book, but let me suggest now that you take it as encouraging you, if you're ready for post-grad-level thinking, to read the whole thing (even if you may, as I do, disagree with some of what it says).