

Chapter 8

The Wrong Questions

Let's take stock. In previous chapters, we explained most of the contemporary discourse in today's earth sciences and social sciences. A few key observations stand out:

- OECD residents consume about three times as much energy and emit about twice as much CO₂ per person as non-OECD residents. However, the OECD contains only 18% of the world population today.
- The world will have ever-more people, use ever-more energy, and emit ever-more CO₂, nowadays increasing only in non-OECD countries.
- The world's temperature is rising. Even though the world will not come to an end, climate change will greatly alter our planet.
- When individuals' actions incur externalities, economics says that governments should curb free-riding by imposing appropriate taxes.
- The integrated assessment models suggest optimal CO₂ tax policies, starting somewhere around \$50/tCO₂ today, rising to about \$300–\$500/tCO₂ by the end of the century.

If you think these summarize the world's dilemma completely, we have to disappoint you. You have not even confronted the biggest problem yet! Worse, nearly every scientist, politician, activist, and interested party (including you) is aware of this problem and will acknowledge it if asked — but then immediately (un-)merrily go back to ignoring it.

The wrong question is “what should the world set as its cost of CO₂?”

The right question is “what will the actual decision makers do, how can they be influenced, and what will be the result for the world?”

1 Problems, Choices, and Outcomes

The first issue to keep in mind is that talking about changing human emissions starts at the wrong point. Emissions are outcomes. They are determined by cost-benefit analyses of economic actors and harsh realities. For example, people choose to have children, live their lives, and die. Their emissions are not their primary decision but an outcome. They are a by-product, based on many individual costs and benefits and primarily related to their uses of energy. If we want to influence global emissions, we need to influence whatever goes into individual decisions. We must analyze and understand choices, not just outcomes.

The second issue to keep in mind is the distinction between individual choices and collective outcomes.

The Collective Problem: This requires an economic analysis of what would be the optimal policies from a collective perspective—here what’s best for humanity and possibly for the overall biosphere.

The Individual Problem: This requires an economic analysis of those who make the decisions — depending on the context, this can be individuals or governments.

The collective problem is about quantifying the effects of pollution in the context of global warming. It helps answering questions such as:

- How quickly should humanity ideally get off fossil fuels?
- How bad is it if humanity fails to do so?
- What price should humanity pay for the privilege of emitting CO₂ (the social cost of CO₂)?
- How should humanity best transition to clean(er) energy?

Many climate scientists have focused their careers on answering these collective-problem questions. When Nordhaus and Stern work out the social cost of carbon in their integrated assessment models, they are working out answers to the collective problem. When you read in the media about the dire effects of climate change, their articles are written from the point of view of the collective problem. The reason why you purchased our book may well have been because you wanted to find out how much the world should reduce its emissions.

Yet the reason why thinking primarily in terms of the collective problem is a mistake is comically simple: humanity does not make decisions. Therefore, global cost-benefit optimization for the world is largely just an intellectual curiosity.

There is one important useful insight that can be gleaned from the collective analysis and it is the obvious: If the actual decision makers do not care enough about the pollution that they impose on others, then they are collectively burning too much fossil fuel. When individual decision-makers choose to reduce their fossil-fuel use, the rest of the world benefits as well. The collective benefit exceeds the individual benefit, and currently by a lot (to the tune of \$50/tCO₂). Thus, we know that the world would be much better off with greatly reduced CO₂ emissions, and that unless the mitigation actions are really expensive, they are probably in the global interest. There are a host of CO₂ reduction policies that would make humanity better off.

Our book considers the primary focus on the collective-choice problem to be a conceptual mistake. It is a common mistake made by natural scientists, social scientists, politicians, activists, and ordinary people. Even economists often discuss the individual problems only as an afterthought to the collective problem. Although Nordhaus, Stern, and almost everyone else have thought much about free-riding, even they almost always end up going back primarily to arguing about what the world should do and how much it should tax CO₂.¹

Many people will now retort to our assessment with “of course we knew this” — and they are correct. Yet, the public debates suffer from tunnel vision. They fail to put the horse before the cart. The real problem is not the collective problem but the individual problems. The fact is that the latter (individual) problems largely render discussion of the former (collective) problem moot. Then why are we all spending so much time discussing it? Why are you always instinctively making climate-related arguments that begin with the words *The world should ...?*

Please sequester this mode of collective analysis out of your mind!

It's futile. The world is not The Borg.

¹Nordhaus in particular has been trying to offer potential solutions to the global public-goods problem. We will talk about his preferred approach in the next chapter. (Stern has recently focused more on local effects and actions.)

sidenote

Environmentalists sometimes accuse others of being callous to the misery that climate change will cause. How many millions are others willing to sacrifice? Smarter retorts then accuse environmentalists of being callous to the misery that forced energy and development restrictions will cause. How many millions are environmentalists willing to sacrifice? These are both irrelevant accusations. They are not questions where having the correct answer would make a whole lot of difference in the real world.

2 Can We Go It Alone?

I am a decision-maker. You are a decision-maker. To a more limited degree, so is the United States of America. Its decisions are often the outcome of a political process, which need not produce consistent or rational decisions. But nation states are the largest effective decision-makers on the planet, so we will start with them.

In fact, we will start with just us (the USA) alone. For now, assume that the rest of the world will do whatever it will do (hopefully more). We cannot tell them what to do, nor can we take credit for what they will do.

Before we start, please keep the following inconvenient fact in mind:

*Earth's climate does not respond to any one's region's emissions.
It responds only to the sum-total of global emissions.*

Can the USA Go It Alone?

The crib sheet in the appendix summarizes many important facts in our book. Recall the average energy consumption figures per person per day as of 2022:

OECD	USA	Europe	China	India
141 KWh	232 KWh	109 KWh	98 KWh	23 KWh

Now imagine that the USA could reduce energy consumption to the European (and Chinese) standard within one generation. (The Indian standard — with its large poor rural areas — seems out of the question.) Multiply the largest imaginable relative reduction by the U.S. population of 330 million.

Maybe we could collectively wring out a very, very tough 15 PWh via forced reductions in our economic activity — and by this we mean reductions

that could leave us behind the Europeans in terms of standard of living and bring us down about to the Chinese standard of living. (No serious economist believes that achieving this large a CO₂ reduction within one generation via taxes — the good old-fashioned way — could be achieved without such large economic sacrifices. The idea that speedy drastic reductions are cheap is simply absurd. Only small reductions are.)

Remember, other nations will do what they will do. With a predicted world energy consumption of 260 PWh by 2050, our 15 PWh reduction would leave 94% of primary energy consumption untouched.

It takes approximately 200-250 GtCO₂ to change Earth's equilibrium temperature by 0.1°C. If U.S. annual emissions of 5-6 GtCO₂e per annum today, curtailed to about 3 GtCO₂, it would take about a century to lower the equilibrium temperature by 0.1°C, from 3.0°C coming to 2.9°C coming.

Furthermore, the nature of global warming is such that the beneficial climate effects would take decades to occur and our 6% contribution would be small enough not to cause a noticeable effect in warming. Realistically, a 15 PWh reduction could reduce global warming by about 0.05°C in 2100, out of total global warming of about 3.0°C. To implement our American belt-tightening program would also require not just one charismatic politician but a series in succession to cover decades of commitment. It is difficult to see how this could plausibly happen in the context of the American political system.

Remind us — why are we even discussing solo fighting against climate change? This approach seems to border on the absurd.

Can Europe Go It Alone?

The only countries that have achieved reasonably notable reductions in their CO₂ emissions through policy-based interventions are Japan and European Union countries. Bureau, Quinet, and Schubert (2021) have described some of the challenges in accomplishing this in a cost-efficient way via policy interventions.

Although we laud the intent, success in these regions is not success in the World (and it is unlikely to spread to the rest of the world). Japan emitted about 1.0 GtCO₂, Germany about 0.7 GtCO₂, and France 0.3 GtCO₂. The European part of the OECD together emitted 4.0 GtCO₂. With projected

further population declines and policy changes, the European Union is now expected to wring out a drop from 4.0 GtCO₂ to about 3.7 GtCO₂ by 2050e. As welcome as these 0.3 GtCO₂ reductions are — especially in the context of reducing not only CO₂ but also local particle emissions — they are less than *a drop on hot stone* using the German idiom here (i.e., immaterial) as far as global climate is concerned.

Can the OECD Go It Alone?

What if the OECD were of one mind (and it rarely is)? Could coordinated decisive OECD action based on CO₂ taxes shrink world emissions? Still no. The OECD could only slow the growth in emissions. It cannot lead to a net reduction in world emissions from today's level.

Even if the OECD could shut down all economic activities and return to the stone age, and even if the OECD closed-down industries did not simply relocate to Asia to merrily continue operating there, the world could still not maintain today's emissions, much less reach a zero-emissions future. Instead, the world would be back to today's energy use by around 2060, i.e., roughly within one generation — and with emissions rising in the following years.

We must not ignore the inconvenient truth that *energy use and emissions are no longer primarily a rich-world luxury problem*. The OECD is already responsible for only about one third of the world's energy consumption and this share is declining. Within a generation, it will be less than a quarter. If we want to make a dent in world problems, we “elitist” Western environmentalists must lose our ethnocentrism.

Regardless of what you consider fair or unfair, the hard fact is that there can no longer be a reduction of global energy use unless non-OECD countries greatly reduce their emissions, too.

Can't the Non-OECD Join In?

Forced growth constraints on energy use in non-OECD countries seem even more unrealistic than drastic reductions. The residents of these countries want to escape poverty. Their energy consumption is not a luxury problem.

It does not require much prescience to predict that Bangladeshis, Indians, and Pakistanis as well as Africans will put great pressure on their leaders to improve their standards of living — and with it their energy consumption. It seems absurd to imagine that the Indian population would be willing to forego development for the sake of the greater good of the world, much less on behalf of Western climate activists. (Similar observations hold for the other non-OECD regions, but on smaller scale.) Climate protests are not likely to meet with great success in India, Africa, and beyond — except when they are about *other* countries.

What about China, a middle-income country? The OECD emits about 13 GtCO₂/year. China already emits about 10 GtCO₂/year. Climate protests are not allowed in China — except perhaps when they are about *other* countries.

Could the OECD cover the Non-OECD?

The world emits about 40 GtCO₂ per year today. By 2050, it will emit about 45 GtCO₂ under RCP4.5 and 60 GtCO₂ under RCP7. Let's assume that the difference of 20 GtCO₂ is the removal target. (Recall from Chapter 4 that this would reduce global warming by about 0.1°C by 2050 and 0.3°C by 2100.) What if other countries — like China and India — are unwilling to participate in the reductions? Could the OECD countries take care of the entire 20 GtCO₂ alone?

Assume for illustration that it costs \$50 to remove one ton of CO₂. This \$50/tCO₂ is the social cost of CO₂ in most integrated assessment models. The \$50 removal cost is far below the current sequestration CO₂ cost (of \$200–\$300/tCO₂) that some developers of industrial carbon credits are shooting for — and media are often describing with such endorsements as “the world needs sequestration to reach its net-zero goal.”

However, \$50/tCO₂ is also far above the cost of smarter tree-based sequestration (\$10/tCO₂). Similarly, simply avoiding CO₂ omissions would also be cheaper than sequestration. The cost further depends on how quickly and

how much we want to reduce CO₂ emissions. Removing the first gigatonne of CO₂ could be dirt-cheap, but removing 20GtCO₂ too soon could drive the cost well above \$50/tCO₂.

For our illustration, at the \$50/tCO₂, the total removal cost is about \$1 trillion per year. The \$1 trillion cost would be about 1.2% of world GDP in 2020.

USA: In purchasing power, the EIA assesses world GDP to consist of

	OECD	USA	Eur	Non-OECD	China	India
2022	44%	15%	18%	56%	20%	7%

With 15% of world economic activity, the United States would have to dedicate not just 1.2% of its output, but 8% of its output to reduce global warming from 3°C to 2.6°C in 2100. For perspective, this is about twice as much as the U.S. spends on its military. It is much more than the U.S. spends on its entire education system, primary and secondary schools, colleges and universities combined. The U.S. thus faces a choice: it could either continue educating its residents or reduce global warming from 3°C to 2.6°C in 2100.

We can also calculate per-household equivalents. The CO₂ reduction cost would be about the same as four to six months of rent for a typical two-income household in the United States. Is this a realistic ask?

OECD: If all OECD countries together could agree among themselves to pay for global CO₂ removal, then the proportional cost would only be about 3% of GDP — still a gigantic number but now only about the same as the cost of all higher education. The all-OECD choice would then be between free university education for everybody and reducing global warming from 3°C to 2.6°C in 2100.

We will return to how realistic cost sharing among countries is in the next chapter. Let us just close with the observation that China and India are growing rapidly while the OECD is not. Within one generation, the EIA expects the following:

	OECD	USA	Eur	Non-OECD	China	India
2050	33%	13%	13%	67%	22%	15%
Change	-11%	-2%	-5%	+11%	+2%	+8%

By 2050, China and India together will host more economic activity than the OECD. It is true that all countries will be richer and thus that removing 20 GtCO₂ will become relatively more affordable — but will OECD citizens find it more galling to carry the world when China and India will have greater GDP, faster growth, and much higher emissions?

If you need further evidence, the Byrd-Hagel Senate resolution of 1997 passed *unanimously* 95-to-0 in the U.S. Senate — itself a near-miracle to see so much agreement across the aisle. It stated that the US should not sign a climate treaty that would “mandate new commitments to limit or reduce greenhouse gas emissions, unless ...[it]... also mandates new specific scheduled commitments to limit or reduce greenhouse gas emissions for Developing Country Parties within the same compliance period.”

We are not done yet. Our estimates are in line with the fact that developing nations have recently asked for \$1.3 trillion per year in climate support at recent climate conference — *or else* they plan to ramp up their fossil fuel consumption. We note that many of these countries have notoriously high levels of corruption. Who will vote to send money to Congolese warlords? And even if the OECD were to volunteer to pay, it is unclear how the donors could appropriately channel the funds in a way that would accomplish their emissions reduction intent.

The key question to us is not whether it would be appropriate for the OECD to send this much money abroad, but whether it seems plausible to expect it. How realistic would you judge such a transfer? We believe the answer is exceedingly unlikely. There are a lot of things that we think the United States and OECD might do, but “just say no to fossil fuels,” pay off poorer countries, and see Earth warm up 2.5°C instead of 3.0°C over future decades is not plausibly one of them.

Once again, remind us — why are we even discussing this? This approach — of the OECD paying non-OECD countries more than token amounts — seems to border on the absurd.

Money and Mouths

In October 2021, a small number of climate activists held a one-week protest in Washington against fossil fuels. Although we share their goal of greatly reduced emissions, we do not believe that most of them understand what it is that they are asking for. If they managed to influence policy with their current ideas, the outcome could be a greatly reduced standard of living with no noticeable effect on global climate change — in our opinion the worst of all worlds. Instead, we wished that would be demonstrating for policies that could plausibly reduce global emissions and global warming.

The country with the most concern for climate change and the most public discourse on the subject may well be Germany. In a November 2021 survey, German 14- to 29-year-olds expressed that climate change was their number one concern. How much skin are they willing to put into the game?

Among those surveyed, 60% regularly travel by car and more than 80% cannot imagine life without one. Only 19% are willing to make the sacrifice of life without a car. Only 27% are willing to forego flying — recall from Chapter 1, air travel is the biggest luxury carbon emission that most of us will rack up within our lifetimes. It's easy to protest against *the other bad guy*. But even when it comes to foregoing what can only be described as luxuries, their own sacrifices become suddenly much more difficult.

Summary

The decision problems that really matter are those that actual decision-makers can make. Realistically, this means that

1. Climate-related policies that are *much* too expensive for their local benefits will not be adopted. (Local benefits include reduced local pollution and more clean energy-related jobs.)
2. Climate-related policies that do not cause growing numbers of actual decision-makers to voluntarily adopt them (such as cheaper clean technology) cannot be trusted to be adopted widely enough to meaningfully reduce global warming.
3. Climate-related policies that do not work in non-OECD countries will always be very limited in their potential. Real solutions have to work worldwide.

The only evidently promising way forward is cheaper clean energy. Technological progress could make it in the self-interest of individual countries and individuals to leave fossil fuels. In a nutshell, that's the point of our book.

It follows then that fighting climate change should be mostly about advancing clean technology in order to lower the cost of voluntarily adopting it. (Part III of our book.)

Our suggestions are not as passive as those proposed by ardent free-market proponents. There are a lot of steps that governments can take that will reduce fossil fuel use without being contrary to the self-interest of politicians or their constituents.

How can we accelerate the transition to clean energy? Given the many market impediments involved in fundamental energy research, development and deployment, and the terrible localized particle pollution created by fossil fuels, there is a lot that can do today to help *move the needle*. Identifying and exploiting those opportunities is the best way forward — not toothless appeals to carbon footprints, public relations, or international negotiations. Steve Jobs did not have to negotiate international agreements or appeal to people's ethical sentiments to adopt iPhones. People chose to buy iPhones because they were better than what they had before. Fortunately, clean technology is becoming better all the time, too — like iPhones. And cheaper, too! (We will explain in part III what is still missing.)

Our suggestions are more limited than those of many climate activists. This is not because we are climate-change deniers or fossil-fuel advocates. On the contrary! However, this is not the point. Our suggestions are more limited because we believe that “the world” has fewer levers than the activists realize. It’s all about the individual problems, not about the collective problems. *Pies in the sky* do not make the air cleaner.

Further Readings

- Bureau, Dominique, Alain Quinet, and Katheline Schubert, 2021, [Benefit-Cost Analysis for Climate Action](#), *Journal of Benefit-Cost Analysis*.
- Nordhaus, William, 2018, [Nobel-Prize Lecture](#), mentioning climate compacts.