PART I

Setting the scene

1 *Introduction and overview*

In the late 1980s the United Nations began the first round of formal talks on global warming. Over the subsequent two decades the scientific understanding of climate change has improved and public awareness of the problem has spread widely. These are encouraging trends. But the diplomacy seems to be headed in the opposite direction. Early diplomatic efforts easily produced new treaties, such as the 1992 UN Framework Convention on Climate Change (UNFCCC) and the 1997 Kyoto Protocol. Those treaties were easy to agree upon yet had almost no impact on the emissions that cause global warming. As governments have tried to tighten the screws and get more serious, disagreements have proliferated and diplomacy has stuck in gridlock.

This book aims to explain the gridlock and offer a new strategy. My argument is that the lack of progress on global warming stems not just from the complexity and difficulty of the problem, which are fundamental attributes that are hard to change, but also from the failure to adopt a workable policy strategy, which is something that governments can change. Making that change will require governments, firms, and NGOs that are most keen to make a dent in global warming to rethink almost every chestnut of conventional wisdom. In this opening chapter, I will summarize my argument in six steps.

Step 1: why the science of global warming matters

Any serious effort to slow global warming must start with one geophysical fact. The main human cause of warming is carbon dioxide (CO_2). Other gases also change the climate, but compared with CO_2 they are small players.[1] Making a big dent in global warming requires making a big dent in CO_2. Most of the economic and political challenges in slowing global warming stem from the fact that CO_2 lingers in the atmosphere for a century or longer, which is why

climate policy experts call it a "stock pollutant." The stock of CO_2 builds up from emissions that accumulate in the atmosphere over many years. As the stock rises global warming follows in tandem. Because the processes that remove CO_2 from the atmosphere work very slowly, big changes in the stock require massive changes in emissions. Just stopping the build-up of CO_2, for example, requires cutting worldwide emissions by about half. Lowering the stock, which is what's ultimately needed to reverse global warming, demands even deeper cuts. Exactly how much of a cut will be needed is hard to pin down because the natural processes that remove CO_2 are not fully understood. There's a chance they will become a lot less effective as the stock of CO_2 rises, which would imply the need for even deeper cuts.

Because CO_2 is a stock pollutant the problem of warming is global. Emissions waft throughout the atmosphere worldwide in about a year, which is much faster than the hundreds of years needed for natural processes to remove most of that pollution. Politically, this means that every nation will evaluate the decision to cut emissions with an eye on what other big emitters will do since no nation, acting alone, can have much impact on the planetary problem. Even the biggest polluters, such as China and the US, are mostly harmed by pollution from other countries that has wafted worldwide.

Because our chief pollutant is CO_2, we know that serious regulation will mainly focus on energy policies. CO_2 is an intrinsic by-product of how society burns fossil fuels today, and the vast majority of useful energy that powers modern economies comes from fossil fuels. Tinkering at the margins of the energy system won't make much of a difference. Deep cuts in CO_2 will probably require a massive re-engineering of modern energy systems. Such an effort will alter how utilities generate electricity and the fuels used for transportation, among many other implications. Such a transformation is not impossible; in fact, over history it has happened several times.[2] But no country – let alone the world community – has ever planned such a transformation in energy infrastructure. At this stage nobody knows what it will cost, but most likely it will be expensive. Because energy systems are based on complicated infrastructures it is likely to unfold slowly. And because this transformation will require new technologies and business models that do not yet exist the political interest groups that can keep the process

on track do not yet exist. The pace of this transformation will be impossible to plan and predict to exacting timetables.

That's the first step in this book. CO_2 is a stock pollutant, and from that simple geophysical fact comes two important political insights. One is that regulation will require international coordination. The other is that governments will have a hard time making credible promises about exactly how quickly they can make deep cuts in CO_2. Because CO_2 is interwoven with energy systems that are costly and sluggish to change, when governments tighten the screws on emissions – something that has not yet happened except in a very small number of countries – they will find it increasingly difficult to plan and adopt the policies needed to make a difference. As the cost of this transformation rises, what every country does will depend on confidence that other countries are making comparable efforts. Yet even governments working in good faith will be in the dark about what they can really deliver.

Step 2: myths about the policy process

Second, I will argue that international coordination on global warming has become stuck in gridlock in part because policy debates are steeped in a series of myths. These myths allow policy makers to pretend that the CO_2 problem is easier to solve than it really is. They perpetuate the belief that if only societies had "political will" or "ambition" they could tighten their belt straps and get on with the task. The problem isn't just political will. It's the imaginary visions that people have about how policy works. Chapter 2 devotes some space to puncturing these myths.

One is the "scientist's myth," which is the view that scientific research can determine the safe level of global warming. Once scientists have drawn red lines of safety then everyone else in society optimizes to meet that global goal. The reality is that nobody knows how much warming is safe, and what society expects from science is far beyond what reasonable scientists can actually deliver. Policy makers often ask for a "scientific consensus," but nothing that is really interesting to scientists lends itself to consensus. The climate system is intrinsically complex with few useful simple red lines; "safety" is a product of circumstances and interests not just geophysics. The result is an obsession by policy advocates with setting false and unachievable goals.

Over the last decade many scientists and governments have set the goal of limiting warming to 2 degrees, which has now become the benchmark for progress on global warming talks. Two degrees is attractive because it is a simple number, but it bears no relationship to emission controls that most governments will actually adopt. And it isn't based on much science either.

Serious policies to control emissions will emerge "bottom-up" with each nation learning what it can and will implement at home. Just as countries learn how to control emissions they will also look at the science, along with their own national vulnerabilities to climate change, and determine the level of warming they can stomach. It is highly unlikely that countries will arrive at the same answers.

I puncture the "scientist's myth" because it creates a false vision for the policy process – one that starts with global goals and works backwards to national efforts. When pollutants such as CO_2 are the concern, real policy works in the opposite direction. It starts with what nations are willing and able to implement.

A similar myth explains much of diplomacy. Environmental diplomats imagine that progress toward solving problems of international cooperation hinges on the negotiation of universal, legally binding agreements that national governments then implement back at home. The scientist's myth starts with scientific goals and works backwards to national policy. Diplomats make the same kind of error and start with binding international law and draw the same backward conclusion. Events like the Copenhagen conference are the pinnacle of this mythical legal kingdom. They are heroic events organized to produce global treaties. When these events fail to produce consensus the diplomatic community doesn't shift course but merely redoubles its efforts to find universal, binding law.

The reality is that universal treaties are a very bad way to get started on serious emission controls. Global agreements make it easier for governments to hide behind the lowest common denominator. Binding treaties work well only when governments know what they are willing and able to implement. Most of this book is devoted to creating an alternative vision for international law. But getting starting on that alternative requires setting aside the conventional wisdom – widely held in the diplomatic and environmental communities – that has made it hard to focus on better approaches. I will offer my skepticism about this view first in Chapter 2, and when I

look at the history of the climate change diplomacy in Chapter 7 I will fully skewer that point of view. Universal binding law has played a useful role in some areas of international environmental cooperation, but the attributes of the climate change problem require a different approach.

Finally, I will take aim at fictions about technology. The "engineer's myth" holds that once inventors have created cheaper new technologies, these new devices can quickly enter into service. This belief is appealing because it offers hope for quick and cheap solutions. It is also appealing because many engineers believe that the needed technologies already exist. Energy efficiency, for example, is widely believed to be a readily available option for making deep cuts in emissions at no cost. The reality is that much of the exciting potential for using energy more efficiently is not presently practical because the needed technologies are not yet married to how real firms and households make energy decisions. Technological transformation is a slow process because it depends on a lot more than engineering. New business models and industrial practices are needed. The more radical (and useful in cutting the use of fossil energy and CO_2) the innovation, usually the greater the technological and financial risks. Putting those innovations into practice hinges on creating the policies and business practices to manage the risks – especially financial risks – that accompany new technologies. Even when those policies are written in treaty registers and in national laws and regulations, firms that invest in new technology and practices must believe they are credible.

Pretending that engineering innovation is the key step leads to policy goals that are overly ambitious and divorced from the realities of what determines whether these new technologies will actually enter into service quickly. The engineer's myth also allows governments to avoid grappling with the kinds of technology policies that will be needed to make a difference. Innovation is relatively easy; creating the policy environment to encourage the testing and adoption of innovations is almost always the weak link.

That's the second step in my book. It clears away false models of the policy process and lets us focus on what really works. The first step laid bare the essence of the warming problem; the second step helps clear the landscape of confusing ideas. The rest of the book builds a new vision.

Step 3: regulating emissions

The third step in the logic is the most important. Slowing global warming requires a big reduction in emissions of CO_2. Achieving that goal will require international coordination. Before I focus on how to make effective international coordination, I must look closely at what individual national governments are willing and able to implement. That is the task of Chapters 3 and 4.

Oddly, most studies of international coordination on global warming ignore national policy and treat governments as "black boxes." Few analysts of international policy peer inside the box to discover how it works; most just imagine that the national policy process will behave as needed once people have political will and international commitments have been adopted. Black boxing national policy is convenient because it makes it easier to focus just on the simpler and sexier topic of international diplomacy. Such studies start by imagining various ideal mechanisms for international coordination and then expect that the black boxes will follow along with implementation.

The reality is that the black boxes are prone to produce certain kinds of policies. Ignoring those tendencies raises the danger that international coordination will become divorced from what real governments can implement at home. These dangers were not much apparent in the early years of global warming diplomacy because international agreements weren't very demanding. The black boxes could comply without doing much beyond what they would have done anyway. But as governments have tried to tighten the screws on emissions of warming gases, a huge gap has opened between the agreements that diplomats are trying to craft at the international level and what their own governments can credibly implement at home. That gap produces gridlock. It lowers confidence that international law is relevant, and as confidence declines governments become less willing to make risky, costly moves to regulate emissions. In the extreme, the result are agreements such as the Copenhagen Accord – legal zombies that have no relationship to what governments will actually implement yet are hard to kill or ignore. Crafting a more effective system of international coordination requires a vision for how to avoid such international outcomes.

The third step builds a simple theory of national policy. Politically viable policies to control emissions must avoid imposing high costs on

politically well-organized large groups and also avoid making high costs evident to poorly organized but potentially dominant groups, such as voters. Policies that are politically viable will therefore not be identical with policies that are economically optimal, and in some cases the dispersion between the viable and the optimal will be huge. Armed with that theory, later in this book I will outline a new vision for international cooperation that is more likely to mesh with policies that real governments can adopt at home.

My starting point is power, interests, and capabilities. Power tells us which countries really matter and must be engaged in coordination. Interests reveal what those countries will be willing to do. And capabilities are what they are actually able to do.

In global warming, state power is first and foremost a function of current and future emissions. China and the United States are the most powerful countries on global warming because they have the largest emissions and thus the greatest ability to inflict global harm and avoid harm through their actions. Although the United Nations (UN) officially registers 192 countries on the planet, when it comes to emissions only a dozen or so really matter. I show those big emitters in Figure 1.1. Eventually, all governments will need to play a role in controlling emissions because even the big emitters will be wary about adopting costly policies if small countries become pollution havens. China, for example, will not be keen to control its emissions if the outcome is much higher costs of doing business in China and investments (along with jobs and incomes) "leak" to Vietnam, Thailand, Malaysia or other countries that would become more formidable economic competitors without the burden of costly emission controls. But getting started on controlling emissions requires a vision that is connected to the reality of how the most powerful countries – the biggest emitters – might actually control emissions at home.

Whether big emitters actually control emissions is a function of their interests and capabilities. The full list of factors that determine interests is long, and scholars should spend more time trying to explain and predict the variation in national interests. Some countries are highly vulnerable to global warming, such as the low-lying island states; others, such as frigid Russia, are less worried or might even welcome a thaw. Rich countries are usually more worried than poor ones because wealth brings the luxury of focusing on more than just immediate survival. Democracies seem to be more concerned

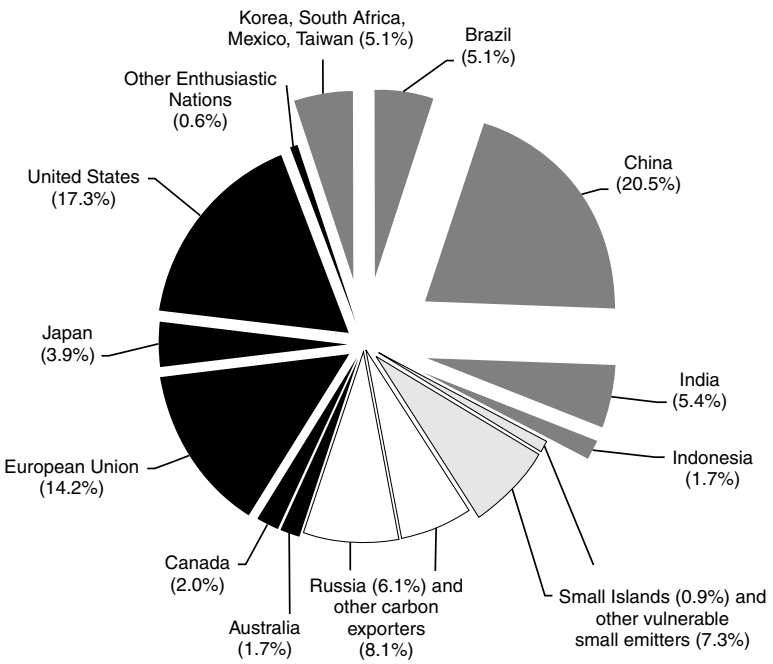

Figure 1.1 National interests and emissions

The figure shows the most recent complete inventory for emissions of CO_2 from burning fossil fuels and changes in land use. "Enthusiastic" countries are shown in black. "Reluctant" nations are shown in dark grey. Together, those twelve countries (treating the EU as one) account for 77 percent of emissions. Excluded from that group is the very large number of small countries (mainly low-income, developing countries) and countries that are large carbon exporters and under little public pressure to regulate emissions, such as Russia and the largest OPEC members. This data set includes full data for CO_2 emissions from fossil fuels drawn from the Carbon Dioxide Information and Analysis Center at Oak Ridge National Laboratory (Boden, Marland, and Andres 2010) augmented with nationally reported data on emissions (and sinks) from land use (including forestry and agriculture) as reported in official emission inventories (see www.unfccc.int and also UNFCCC 2010b). The land use data are 2006 for UNFCCC Annex I countries (i.e., industrialized nations); for non-Annex I countries land use data are 1994 except Mexico (2002) Korea (2001), and Kazakhstan (2005); failures to report data by Angola, Iraq, Kuwait, Libya, and Qatar led me to exclude those countries from the analysis.

than nondemocracies because the ability to organize interest groups and a free press are empowering to NGOs that carry the messages about warming dangers to people and governments around the world. Parliamentary systems are often more energized about warming than presidential governments when green parties become members of ruling coalitions. A nation's interests also depend on what it thinks other countries will do. If one country thinks that emission controls at home will inspire other nations to follow suit it will be more keen to make the move. My home state of California is on the cusp of adopting costly state controls on CO_2 with that theory in mind. A full-blown theory of national interests would need to look at all such factors.

In this book I get started by dividing the world into two categories: *enthusiastic* and *reluctant* countries. Enthusiastic countries are willing to spend their own resources to control emissions. These countries are the engine of international cooperation. The bigger that group and the more resources they are willing to spend on controlling emissions, the deeper the cuts in global emissions. Some of the troubles with global warming diplomacy during the last two decades simply reflected that the group of enthusiastic countries was pretty small and consisted of little more than a few EU members and Japan. But that group is getting bigger and now includes the US and essentially all members of the OECD. Not all these countries have the same interests, of course. What the US is willing to do is a lot more modest these days than the French, German or British effort. And what countries actually do is often not formally labelled climate policy. The US has struggled with national political gridlock on a federal global warming policy, but through direct regulation and many state policies it is making an effort – albeit one that falls short of what it should pursue.

The reluctant nations, such as China and India, also matter. They are already big emitters, and most studies suggest that such countries will account for essentially all growth in future emissions.[3] Because these countries don't put global warming high on the list of national concerns, they won't do much to control emissions except where those efforts coincide with other national goals. Outsiders can change how these countries calculate their national interests by threatening penalties such as trade sanctions or offering carrots such as funding for investments that lower emissions. Outsiders can also provide information on global warming dangers, which will (in time) help reluctant