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The way forward is through Paris

Leaders must come together on a solid agreement at the United Nations climate conference — and then get to work at home by meeting commitments and finding new ways to reduce emissions.

The world's leaders left a fabulous mess in their wake after making a brief appearance at the last major global climate summit. The 2009 Copenhagen negotiations descended into an angry free-for-all, although one basic idea was agreed: that countries, rich and poor, need to step forward with their own climate solutions. This idea stuck and is now at the heart of the negotiations going into the United Nations Paris Climate Conference, where countries will attempt to forge the first ever fully fledged international climate agreement. *Nature* offers a package of stories and commentaries this week (see nature.com/parisclimate) previewing what many expect to be the biggest step so far towards controlling global greenhouse-gas emissions.

That optimism should not be taken as a sign that all is well. Last year was the warmest on record. This year will be warmer still, with average temperatures expected to reach more than 1°C above pre-industrial levels. An array of impacts are already being documented around the globe, including melting ice, decreasing crop yields and shifting animal-migration patterns. And yet, despite a quarter of a century of increasingly desperate debate, greenhouse-gas emissions continue to rise.

We know that any deal emerging from the Paris conference will not solve the problem. Even if nations follow through on the climate pledges that have been made so far, global emissions are projected to rise until at least 2030, and temperatures could reach 2°C above pre-industrial levels as early as 2032. The UN has set the goal of limiting any rise to 2°C, but even this increase would not protect the world's most vulnerable citizens from rising tides, extreme weather and shifting precipitation patterns.

PLETHORA OF PLEDGES

But there are reasons for optimism. Foremost is the fact that a solid majority of nations, accounting for roughly 91% of global emissions, have submitted climate pledges. Many, including those of all developed countries, feature commitments to curb greenhouse-gas emissions. Others, from a plethora of developing countries, focus on sustainable development and adaptation to the impacts of rising temperatures. Even with financial and technological aid, emissions will continue to rise in these countries as governments seek to lift their people out of poverty.

All told, the world's pledges fall short. But for the first time, governments are moving forward collectively; as David Victor and James Leape point out in their Comment on page 439, that is the first step. Although many countries want to make these commitments binding under international law, they will remain voluntary, at least for now. The US Senate's aversion to international treaties is often blamed, but many countries worry about binding commitments given the difficulty of the economic transition that is required. The 1997 Kyoto Protocol included binding commitments from most developed nations — notably excluding the United States — but many developed countries received a free pass. And there were no

real consequences for those that did not live up to their obligations.

The focus now is on building a 'pledge-and-review' system that pushes countries to submit their own national commitments, which are then up for review by other governments and groups. There is some evidence that this 'institutionalized peer pressure' can work: 175 countries have voluntarily submitted pledges so far.

Economic and political momentum is building. Renewable energy is growing faster than anybody projected just a few years ago. The

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consultancy Bloomberg New Energy Finance has projected that renewables will account for two-thirds of the US\$12 trillion that will be invested in electricity generation over the next 25 years. Brazil has made huge progress in reducing deforestation, and the palm-oil industry has committed to reduce deforestation

in Indonesia and other countries. The countries of the Organisation for Economic Co-operation and Development agreed on 18 November to restrict financing for coal-fired power plants, and the United Kingdom is weighing up a proposal to shut down all of its coal plants by 2025. In the United States, coal is on the ropes thanks to a combination of regulation and cheap natural gas.

In Paris, negotiators must provide a strong framework for reporting and verifying climate pledges. Governments, scientists and environmentalists need solid information about who is doing what. And the agreement should require a five-year review process so that governments can identify ways to go even further at the next major climate summit in 2020. Once everybody is pointed in the right direction, the hope is that human ingenuity will kick in, and the world will discover ways to reduce emissions more quickly.

As reported in our News Feature on page 436, however, limiting the temperature rise to 2°C will be difficult. Barring premature retirement of much of the existing fossil-fuel infrastructure, the only way to get there will be to overshoot the target and then bring atmospheric carbon dioxide concentrations back down later in the century. Unless engineers figure out a simple way to pull CO₂ out of the atmosphere, this probably means deploying bioenergy at massive scales, capturing the CO₂ that is emitted during energy production and pumping it underground.

One day, governments may decide that measures such as extreme decarbonization are necessary. In the meantime, scientists must investigate the social, political and economic realities ahead and research the consequences of rising emissions, including potentially catastrophic shifts in the climate system.

In Paris next week, world leaders must come together and signal the way forward for their governments, their citizens and for businesses and investors. If humans want to keep living on a planet that looks, feels and functions like the one we live on now, it is time to sign an agreement and get to work. ■



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