

The Hope and Danger of the Paris Climate Agreement?

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After 21 years of disarray and frustration, the UN climate negotiations appear to have turned a corner and headed for the long-standing goal of holding the world to a 2°C carbon budget. Current pledges do not respect that budget, but three-to-five year reviews¹ will ratchet up ambition just in time. According to UN climate chief Christiana Figueres, if achieving the 2°C goal is like traveling from Washington to New York, we are now in Philadelphia and so we are “on the way to towards 2°C, but not there yet.”²

But the UN report on the Paris pledges, tells us that by the time they are over in 2030, even if the pledges are *perfectly kept*, the world will have used 73% of its CO₂ budget for a 2°C scenario and will be emitting CO₂ so fast the budget will be exhausted in 2037. So any optimism must be based purely on a belief that Paris will adopt a mechanism for improving the pledges rapidly starting very soon.

This report checks for a bases of this belief and finds it lacking. Consequently, the Paris agreement is likely only to instill complacency and block effective action. Finally, this outcome is explained as the inevitable result of a powerful misconception.

1 The Paris Agreement

The Paris agreement was designed in response to the Copenhagen failure. In Copenhagen, few countries would firmly commit to anything. So instead of commitments or pledges, countries now agree only to “Intended Contributions.” No one can measure intentions. Copenhagen also made clear (as had Kyoto³) that countries would accept no meddling with “Contributions.” So the Paris agreement requires only Intended *Nationally Determined* Contributions, INDCs. In keeping with popular discourse, we will call these intentions “pledges.”

There has been talk of making the agreement “legally binding.” But a law does not bind if it is not enforced, and no enforcement has been discussed. The Kyoto Protocol was declared “legally binding” but Canada announced its withdrawal during the Copenhagen conference, and nothing could be said against it. An agreement that can be broken without consequences is not binding.

One attempt to explain the term “legally binding” states that “any agreement clinched in Paris would only become legally binding after approval by individual parliaments.”⁴ But Canada’s parliament had approved the Kyoto Protocol, and parliaments can disapprove agreements just as easily as they approve them.

This war of words may point to a hidden agenda. While there is no proving what is hidden, a glaring omission seems relevant. Without an international government, there is only one way to make an agreement bind, at least a little. That is to provide rewards for compliance, penalties for lack of compliance, or both. Such incentives, though often thought to be essential, have not been part of the discussion. Discussion of “legally binding,” may be diverting attention from this more important topic.

In short, the Paris agreement, in regard to reducing emissions, is simply this. All countries will agree to form either an intention of how much they will emit in 2030 or an intention to take some actions that will affect their emissions in 2030. It would be hard to conceive of a weaker agreement. Naturally, few are refusing to sign.

2 Overview

As already mentioned, at best the Paris pledges will leave us with only seven years of our 2°C carbon budget remaining and hence in much worse shape than we are now. The only reason for hope is the possibility that periodic reviews, starting as early as 2018, might ratchet up the ambition of pledges. And there are only two reasons to hope such a process might work.

1. If the current pledges have ratcheted up ambition, then later rounds might also.
2. There might be some mechanism that would start to work in the next round.

The next two sections address these two possibilities. Since our analyses do not reach optimistic conclusions, we then look more closely at the 2030 outcome given the current pledges. Finally we ask how the world got itself into this predicament. The answer lies in a mistakenly rigid view

of what can form an effective pledge. Finally, we conclude with a reminder of the consequences of false confidence.

3 Does Making a Pledge Make a Difference?

Although the Paris agreement requires nothing, perhaps it has stimulated altruistic “ambition” in the form of reducing emissions below what countries would have emitted without the agreement. This is the claim of two UN reports,⁵ of the EU report⁶ and of various private organizations that have analyzed the pledges. There are three main reasons this claim may not be correct.

1. Unconditional pledges may not be kept
2. Conditional pledges may not get funded
3. Effectiveness claims may be based on false comparisons

The first of these is self-explanatory and the reports take some failure into account in their uncertainty analysis. However the reports do not make clear how this was done. We know that the previous Copenhagen-Cancun pledges are not all being fulfilled and neither were all of the Kyoto pledges. With all the pressure and posturing of the Paris climate conference, and with pledges made so far in advance and with no real consequences, counting on the Paris pledges must be considered risky business. But this is obvious and is not our main point.

The most optimistic predictions, like the one we used above, include *conditional pledges*. But these are not real. Anyone would easily pledge to build \$2.5 trillion worth of wind and solar if someone would just give them \$2.5 trillion. Pledging to provide funding should count. Pledging to spend should not. And for the UN to count pledges to spend money when it is given is not an unbiased approach. Instead the UN should count only pledges to provide funding.

The third point is most important, and is covered in the following subsection. The heart of the problem is this. The UN predicts what would have happened in 2030 without pledges, then predicts emissions with pledges, and then subtracts. At least in the case of China, the most important pledge, the prediction is far too high, and so the effect that the UN negotiations have had on China is grossly overestimated.

3.1 The misprediction of business as usual

Concerning emission in 2030 with the Paris pledges in place, we can ask two different questions:

1. How much lower will emissions be in 2030 than was predicted back in 2010?
2. How much lower will emissions be in 2030 than if no pledge had been made.

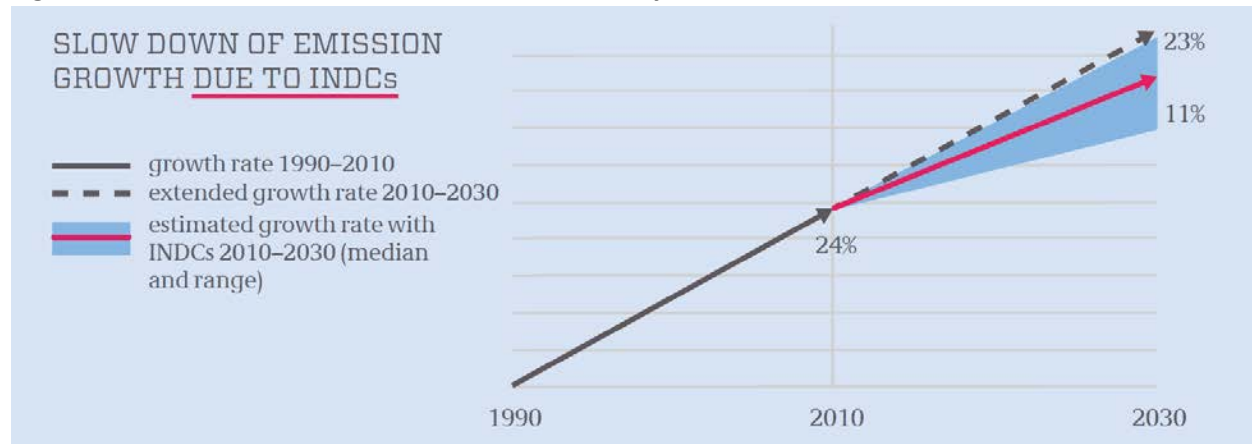
The first question confuses two issues, (1) the accuracy of our predictions back in 2010, and (2) the effect of the pledges. In fact, if the pledges do nothing at all, but our predictions were incorrectly high, we will get a large answer to question #1. That’s misleading. And that happens even if we answer question #1 perfectly. It’s just the wrong question if we want to find out the effect of pledges.

This would not be a problem if the 2010 prediction was a good estimate of what would have happened without the pledge. But here's a hypothetical (but informative) example of why the 2010 prediction might be a terrible estimate of no-pledge emissions in 2030.

Suppose China increased emission from coal at the rate of 0.4 Gt per year from 1990 through 2010, ending up at 10 Gt/year in 2010. Without specific knowledge of China, it would make sense to predict a further increase in coal emissions of 8 Gt by 2030. But what if China knew it was running out of coal and would be unable to increase its coal emissions beyond 10 Gt/year. Then it could pledge to hold its emissions to 10 Gt/year in 2030. But the UN prediction for 2030 would be 18 Gt/year and so the UN report would give the China's pledge credit for cutting emissions by 8 Gt/year—even though the pledge had no effect whatsoever.

Unfortunately, the UN report on pledges answers question #1 and not question #2. Also, many things have changed since 1990 – 2010. We now turn to the report's actual analyses of "Intended Nationally Determined Contributions" (INDCs) and what actually happened before and after 2010.

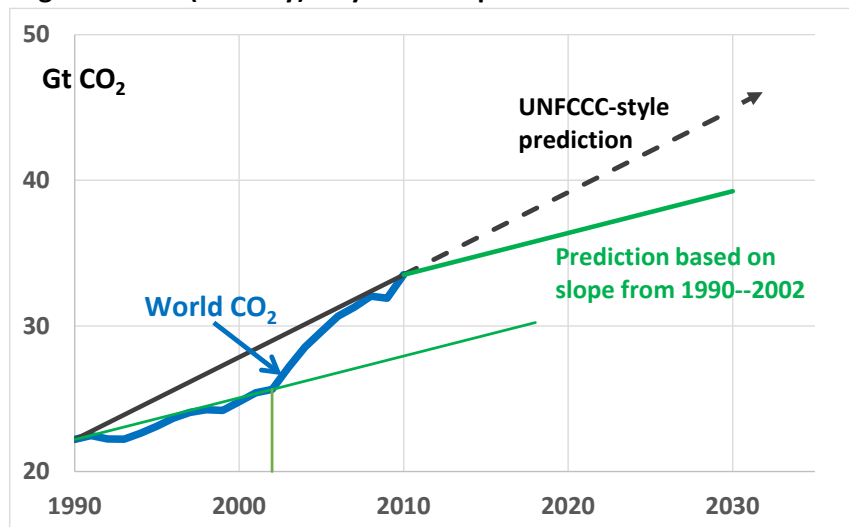
Figure 1. From the UNFCCC overview of its INDC analysis



The graph above is from the official overview of the UNFCCC's October 30, 2015 "Synthesis report on the aggregate effect of the intended nationally determined contributions," the Advance Version. The dotted line shows the prediction made from 2010-and-earlier data. The red arrow shows the estimated emissions with the INDCs from 2010 through 2030. The blue area around the red arrow indicates uncertainty.

Note the claim (underlined in red) that the slowdown of emission growth is "Due to INDCs." In other words, caused by INDCs. In fact the report itself tells us that "The COP ... requested the secretariat to prepare by 1 November 2015 a synthesis report on **the aggregate effect of the INDCs** [emphasis added]." However, it is perfectly clear from the Figure 1 that the report is answering question #1 and not question #2, the question it was asked to answer. How much difference does that make? We begin to answer this with the help of Figure 2, a graph of world CO₂ emissions and two possible extrapolations.

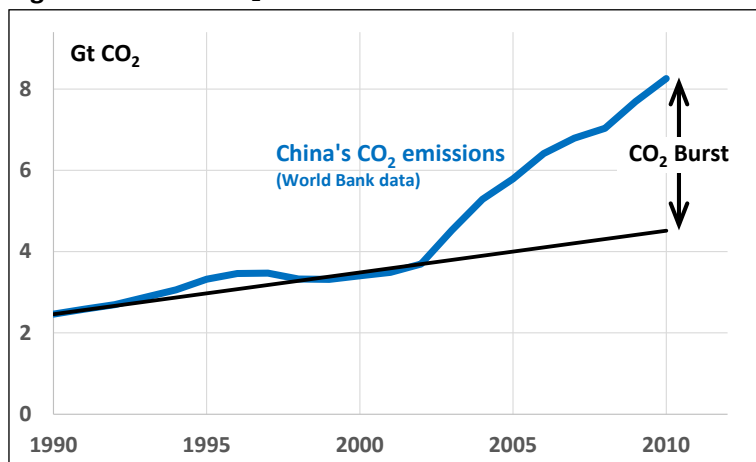
Figure 2. Two (of many) ways to extrapolate world CO₂ emissions



The path of CO₂ emissions was far from linear between 1990 and 2010. Emissions increased at a rate of 0.29 Gt/year for the first 12 years, and by 0.98 Gt/year for the final eight years. If the world were to return to the 1990 – 2002 rate after 2010, emissions would be 5.6 Gt lower in 2030, and the apparent effect of the Paris pledges would be erased.

But does it make any sense to think of world emissions spontaneously returning to their old 1990s rate after 2010? Or to put it another way, what could have produced a 5.6 Gt burst of CO₂ starting in 2002 and then bring it to an end around 2010 or shortly thereafter? Consider the graph of Chinese CO₂ emissions below.

Figure 3. China's CO₂ Burst



In fact, almost 4 Gt of the world's 5.6 Gt CO₂ burst that occurred from 2002 through 2010 can be explained by China's increased rate of emissions after 2002 (from 0.10 to 0.57 Gt/year). So if the Chinese CO₂ burst stops soon after 2010, that termination will be attributed, by the UNFCCC's methodology, to the effectiveness of Paris pledges. In fact, according to the British Petroleum database, China's CO₂ emissions grew by only 0.09 Gt between 2013 and 2014, and

there is every indication this is part of a strong downward trend in China's CO₂ emissions growth rate. This growth rate probably will, as China has pledged, come to a halt before 2030.

3.1.1 The key question: Why is China's CO₂ burst ending?

We still have not determined whether the UN's two-point extrapolation of 1990 and 2010 data mispredicts what would have happened in 2030 without China's pledge. It is just possible that China is stopping its emissions growth because it wants to help stop climate change, and it would otherwise have continued its burst for twenty years. To find out, we first turn to reports from China.

3.1.2 Evidence from China

In July 2008, [CNN reported](#) "China announces emergency Olympics smog plan," and so the Chinese smog problem became world famous. In December 2010 [CNN reported](#) that, "In an effort to rid the city of its high-polluting reputation ... Yang said the city has shut down hundreds of mines and factories, especially small enterprises. ... The closures depleted Linfen's 2007 GDP by almost \$300 million." Linfen is in the heart of China's coal country. Recently the [Pew Research Foundation reported](#) that among 18 major countries, the Chinese populace had the lowest percentage agreeing that climate change is a "very serious problem." Correspondingly, [Bloomberg reports](#) that air pollution is the second biggest concern of the Chinese public, and climate change is not among their top 15 concerns.

The [IMF concurs](#) that reducing local coal pollution is rational, and calculates that it would have been in China's self-interest (not counting climate concerns) to impose a domestic carbon tax of \$63/ton in 2010. So we would expect Chinese initiatives that limit coal emissions to be driven by domestic concerns rather than by climate concerns. And by March 2014, [China's Coal Industry Planning Institute](#) was predicting the 2020 peak in coal use that underlies their pledge to cap CO₂ emissions by 2030. There is no reason to believe this had anything to do with climate. Instead it was likely connected to the view [reported in the New York Times](#) on July 24, 2014. "The director general of the state Energy Research Institute in Beijing said China's "actual consumption of coal is already very close to four billion tons, which is at the limits of endurance for the domestic environment." Of course, China is not about to stop using more energy when it stops using more coal, so this also explains why it plans to increase its use of nuclear, hydro, wind and solar, as promised in its INDC.

3.1.3 Evidence from the UN climate chief

There is of course nothing the least surprising in this analysis, and indeed it is well known that China is acting in its narrow self-interest. UN climate chief Christiana Figueres has said, "China is very, very clearly moving in that direction [towards lower carbon emissions]. Why? First, because they are listening to their citizens who actually would like to breathe air without having a negative impact on their lungs. Secondly, if they ... want to continue being competitive in the global economy [that is, in renewables], they need to be there first [[Interview with CBS News](#), 2 October 2015]."

But we should not blame china for acting in its self-interest. This is the rule not the exception. In fact, Figueres also said in that interview:

The self-interest of every country is what is behind all of these measures. It's not because they want to save the planet. Maybe it surprises you that I say that. Let's be realistic here.

In effect, this says that China's behavior holds for all pledges, and none of the effect calculated by the UNFCCC is "Due to INDCs." That may be a bit extreme, but at heart, it's an important insight.

3.2 Summary of the INDC Report Findings

The UNFCCC's INDC report claims to discover the effect of the INDCs. This would mean it discovers, among other things, how much less China will emit in 2030 than if China had not submitted any INDCs. Yet, the report attempts to predict what China's emissions would have been in 2030 without taking into account any information that could reflect China's concern for the health of its population. As is obvious to all, health is probably the primary factor affecting what China has pledged and what it would have done in the absence of the UN and its INDCs.

Since the UNFCCC has missed the most obvious predictive factor for the business-as-usual trajectory of the most prominent country, and since there is no evidence it has given any thought to such factors for any other country, we must assume that its results are significantly biased across the board.

The only question the report addresses is, "How much lower will emissions be in 2030 than we would expect if we relied on a primitive, nearly linear extrapolation that uses only out-of-date data on emissions and fails to take account of any more recent circumstances no matter how obvious." It is nice to know that the world will do better than that. But this tells us absolutely nothing about "the aggregate effect of the INDCs," which is what the UNFCCC was charged with discovering by the Congress of the Parties.

4 Will There Be a Ratcheting-Up Mechanism?

Because the current Paris pledges are much too weak, it is important that their ambition be increased in subsequent periodic reviews. As mentioned in the overview, there are two arguments for believing that this can happen.

1. If the current pledges ratcheted up ambition, then later rounds might also.
2. There might be some mechanism that would start to work after the first round.

4.1 Does it Matter that China's Pledge Is Not Motivated by the UN?

The premise of the first argument—that current pledges ratcheted up ambition—has just been shown not to hold. So there is no reason to think later reviews will increase the ambition of pledges. This is particularly telling because Paris is not the first round, it is actually the first review. The initial round was the Copenhagen-Cancun round of pledges. So Paris is an excellent test of whether periodic reviews will increase ambition.

In spite of this, there is a confusion that tends to blind observers to the importance of the Paris round's failure to increase ambition. That confusion holds that we should not care why China (or others) are cutting emissions more than previously expected because of negotiations, or for some other reason. This confusion is widespread and dangerous. But we can perhaps disarm it with the use of a simple analogy.

Suppose a certain tribe migrates across a mountain range and plants its crops only to find there is little rain and the crops are doing poorly. So for three months they try various rain dances until one of them—the INDC dance—finally “works.” But the rain is meager and all agree that it will need to be improved by a process of weekly INDC rain dances.

Does it matter whether that meager rain really was “Due to INDC” dancing (see Figure 1) or whether it would have rained that day anyway? One answer is, of course, “No, if you only care about that one day.” But if you are going to depend on the INDC dance to improve things in the future, then it matters a great deal. By all accounts we are going to depend on the INDC process a great deal in the future. We return to this in Section 5.

It is also useful to answer this question in reverse. Suppose we believed that it did not matter whether the UN's INDCs were motivating ambition and believed that they were not. Then we would have to conclude that the UN negotiations and the future rounds of pledge and review are unnecessary. Perhaps we would need the UN to distribute some reports on the costs of health problems caused by smog, but there would be no need for further UN negotiations.

Since we see no one coming to this conclusion, we again conclude that it matters a great deal whether China and other countries have been motivated by the own local pollution problems, or they have been motivated by the UN negotiations.

4.2 Will pledge-and-review produce an upward spiral of ambition?

There is no evidence the INDC dance worked this time, but might it work in the future? Fortunately the behavioral sciences (political science, behavioral economics and psychology) have been conducting experiments on this question and making field studies of it for decades. The political scientist Elinor Ostrom spent her career analyzing these experiments and studies and conducting them herself. In 2009 she received the Nobel Prize in economics for her work on this question.

The climate problem is a fairly standard public-goods problem, although in several respects it takes a particularly difficult form. For example, the benefits of the public good (emissions abatement) mainly accrue to the grandchildren of those paying for the good. Because of such unfortunate particulars we expect cooperation to be less likely to occur than it is in simple laboratory experiments. We expect to see more free-riding in the context of climate negotiations, in other words, more acting according to narrow self-interests.

In laboratory experiments, which typically have 10 or 20 rounds of “contribute and review,” it is typical to see a fair amount of cooperation (roughly half of the social optimum) on the first round, followed by a fairly rapid spiral *down* into almost pure narrow self-interest.

In the field, Ostrom finds that without some form of governance agreement—an agreement governing the contributions of various parties and some penalty for breaking the agreement—there is little if any cooperation. Narrow self-interest is all that is observed.

However, Ostrom was particularly interested in cases similar to the climate dilemma, in which there is no government available to solve the common-resource problem. In this case, a top-down approach is impossible. What she finds is that participants can self-organize a governance mechanism, just as the UN is trying to do. However, she also finds that the keys to success are always “reciprocity and trust.” Reciprocity is based on trust, but also necessary to sustain trust. In fact reciprocity is the key to almost all cooperation observed in the field and in experiments.¹

The reason pledge-and-review, as it is designed now, should be expected to fail, and the reason it has failed so far, is that it carefully avoids any built-in mechanism to support reciprocity. In a group, this is essential. There are some countries that will not cooperate in any ambitious agreement, because they place a low or negative value on success. Consequently, an ideal universal mechanism is impossible. However a large “coalition of the willing” is likely possible. Designing this will take time and a new approach. For this reason steps in this direction should be taken immediately. The first step should be to stop ignoring the fact that the behavioral sciences have been studying this problem for decades and have much to contribute.

5 What happens without a ratchet?

Returning once again to the rain analogy—if it rains, does it matter why it rains? Again the answer is, “not if that rain is enough.” But if much more is needed, then it matters a great deal whether or not the rain dance is working. If it is, then by all means keep dancing. If it would have rained anyway, then stop dancing and start working on an irrigation system or something else that stands a good chance of working.

So the crucial question is, “are the INDCs enough?” There is nearly universal agreement that they are not. But that answer is not well understood. The analogy that Figueres uses holds that the current INDCs are like getting to Philadelphia when traveling from Washington DC to New York. The claim is that we are a lot closer than we were before. But if the INDCs had almost no effect, which seems more than likely, perhaps we’re still in DC. In fact, if the INDCs are

¹ In the climate context, reciprocity (“I will if you will” or “I won’t if you won’t”) can take several forms. The Kyoto negotiators attempted ten versions base on emissions quantities, such as, “I will cut emissions X% below my 1990 level, if everyone else does.” None of these could be agreed upon, because all seemed too inequitable. “I will price carbon a \$30, if all others price it a \$30,” comes much close to being equitable. We will take the carbon in your exports if you don’t, is a form of negative reciprocity. “We will pay poor countries from the climate fund, if they meet the price their carbon at the world level” is yet another reciprocal agreement.

In fact the conditional pledges, like India offer to spend \$2.5 trillion on renewables if it is given those funds is an offer of reciprocity, although an extremely inefficient and lopsided one.

implemented perfectly, including the conditional pledges, we will be in Atlanta, heading the wrong direction, with no chance of making it to New York.

The trouble with the travel analogy is that it ignores the fact that if you delay, you can use up your whole carbon budget before you get to Philadelphia. The standard carbon-budget way of thinking about climate policy is more informative. The UNFCCC report uses this approach, concluding it is necessary to keep total CO₂ (not CO_{2e}) emissions below 1000 Gt in order to have a 66% chance of keeping the global temperature increase below 2°C.²

The problem with the INDCs is that, even if all are carried out perfectly and completely, they will use up 723 Gt of the 1000 Gt budget by the time they expire in 2030. This leaves only 277 Gt remaining, and a CO₂ emission rate of 40 Gt/year. This is according to the UNFCCC report. At that rate, the budget would be exhausted in another seven years. How much could we stretch that out by cutting back? A very good idea of that answer is given by a linear reduction in emissions to zero. If that were carried out over 14 years, the budget would just barely be met.

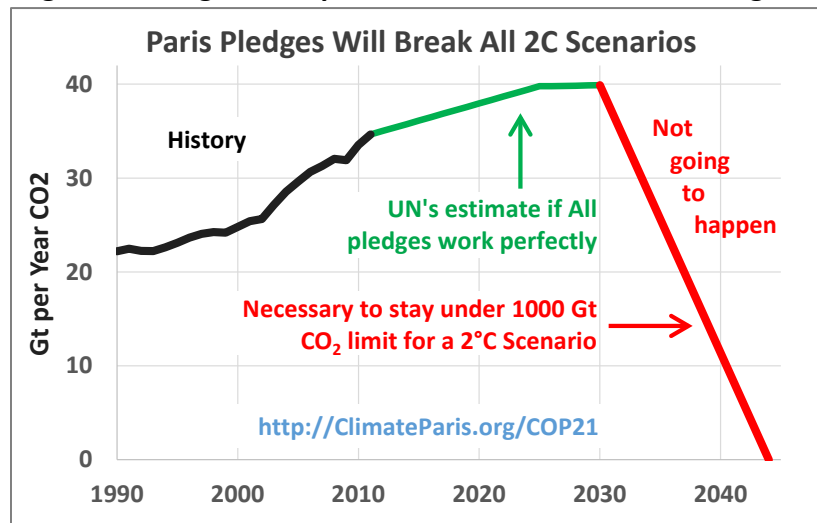
But up until 2030, the world will have been building more new coal-fired power plants (to replace old ones in China and to expand the fleet in India and other developing countries), and more gasoline and diesel cars and trucks, and it will have at least as many gas and oil home furnaces. This all follows from the fact that total CO₂ emissions will have increased about 20% instead of decreasing. Given this situation, it is simply unimaginable that all of this investment will vanish in just 14 years. In fact it is much more likely that emissions will have only just started to come down and will still be as high as they are today and nowhere near zero.

So in fact, the current INDCs set us on no particular path, for as the UNFCCC report correctly notes, “temperature levels by the end of the century strongly depend on assumptions on socioeconomic drivers, technology development and action undertaken by Parties beyond the time frames stated in their INDCs (e.g. beyond 2025 and 2030).” In fact the INDC, cover only the tiniest sliver of the action needed by 2100. The report then rightly avoids the type of speculation found in other reports regarding the temperature path we are on.

But what we do know is that the plans recorded in the INDCs (but not caused by the INDCs), even if followed to the maximum extent, will prevent any possibility of achieving the 1000 Gt limit corresponding to a 66% chance of staying below 2°C global temperature increase.

² “According to the AR5, the total global cumulative emissions since 2011 that are consistent with a global average temperature rise of less than 2 °C above pre-industrial levels at a likely (>66 per cent) probability is 1,000 Gt CO₂.”

Figure 4. Pledges use up at least 73% of the carbon budget³



6 What went wrong?

The current state of negotiations is determined by a misconception. It begins with the idea that since the quantity of CO₂ must be limited, countries must agree on a total global quantity—a carbon budget for the future. Typically this is set at about 1,000 Gt. But if the world agrees on any such budget, it must then agree on how much of the budget each country can use. This is a massively divisive problem because no country wants any other country to dictate a limit on its future use of carbon.

The result has been a twenty-year deadlock followed by the coming Paris agreement. The Paris agreement will resolve the deadlock by letting every country agree to do whatever it wants. We already know what countries are doing, and there has long been peer pressure, and as with every similar problem of the commons, this arrangement has been failing spectacularly. There is no sign this will change and as explained above, all of the behavioral sciences predict this failure.

Is there any way out of this trap? If it could be understood there is an alternative that is dramatically more conducive to cooperation, then there is a way out. However, such understanding is blocked by three powerful forces:

1. Quantities are the simplest way to think about the problem.
2. Climate science necessarily analyzes emissions quantities and this gives them a scientific aura within the policy world.
3. Many environmentalists strongly prefer quantity limits because these appear to be more certain.

Although it now seems hopeless, here are a few points that might help to dispel these myths.

³ The historical data in Figure 4 is labeled simply “CO₂ emissions” in the World-Bank data set, and it is assumed to be consistent with the CO₂ emissions in the UNFCCC report.

1. Science cannot determine an optimal carbon budget, and those who claim this is possible disagree violently on what it is. The 350 group claims we exceeded the scientifically determined budget in 1988 while most believe we can keep emitting at the present rate until 2040. But the latter depends on the arbitrary choice of a 66% chance of staying under 2°C.
2. Some say a carbon price will necessarily be too weak, while an emission cap will be strong. But an emission cap has its effect only through the carbon price it creates. So this argument amounts to asserting that a cap will surely trick people into accepting a high price. In practice, caps have resulted in low prices, while the Swedish carbon tax is near €100/ton and many gasoline-carbon taxes are much higher.
3. The bottom-line argument, however, is this: Developed and developing countries will never agree on how to divide a cap, so a cap accomplishes nothing.

The conclusion by a number of the most eminent climate economists is that while a carbon price is no panacea, it would provide a basis for reciprocal cooperation. And true cooperation is our only hope against such a vicious problem of the commons as climate change. This approach is well described in a free PDF book available at PriceCarbon.com. Its authors include two Nobel Prize winners as well as Stephane Dion (the foreign minister of Canada) and David MacKay, the former Chief Scientist at the UK Department of Energy and Climate Change and a world-renowned expert on renewable-energy technology.

7 Conclusion: Is Paris Better than Nothing?

The Paris agreement has benefits. Just before the conference, it appears that it will reduce the level of acrimony that has plagued the negotiations.

But there is an advantage to “nothing.” The failure of Copenhagen was transparent. That motivated countries to agree to join in making pledges—a critical step, which then stalled. But at least after Copenhagen, the world knew where it stood. It had less than nothing—only acrimony.

Now it has nothing but an illusion. And that illusion is dangerous, because it will instill complacency in environmentalists, the public and world leaders alike. And with pledges that don’t even start for five years, by the time the world wakes up it will be much too late.

References

¹ This is the clause for which the French have been pushing hard. <http://www.france24.com/en/20151128-paris-summit-climate-change-cop21-global-warming>.

² “Can this woman convince the world to act on climate change?” CBS News, 2 October 2015, <http://www.cbsnews.com/news/can-christiana-figueres-convince-the-world-to-act-on-climate-change/>

³ The Kyoto negotiations fail to agree on any common commitment and on the final day, representatives were just asked to step up to the podium and fill in their emission reductions. These ranged from a reduction of 8% to an increase of 10%. See Depledge.

⁴ As explained by Amy Dahan, a climate specialist at France's National Centre for Scientific Research (CNRS), <http://www.france24.com/en/20151128-paris-summit-climate-change-cop21-global-warming>

⁵ UNFCCC and UNEP

⁶ EU report