It’s easy to lose heart about our prospects for limiting climate change. The US has pulled out of international climate negotiations. Most of the countries that joined the Paris Agreement have missed targets , targets that weren’t aggressive enough in the first place. The 1.5° target is already basically out of reach. Is it time to give up on slowing climate change and focus on adapting to it? The answer is no. Here’s why we need to continue the fight to reduce carbon emissions, even in the face of setbacks.

Climate change is a matter of degrees. That sounds like a truism or a pun, but it’s true in a deeper sense. There is no point past which further warming becomes irrelevant. The harm from 3.0°of warming is worse than 2.5°. which is worse than 2.2°, which is worse than 2.0°. And so forth. So even if we were to blow past every temperature target we’ve ever set, every ton of additional carbon dioxide would raise the temperature some fraction of a degree, and every fraction of a degree makes things worse.

Actually, as atmospheric CO2 increases, the harm done by an additional ton of carbon may actually increase. The reason is that, while an additional ton of CO2 causes about the same amount of warming as every previous ton, the same amount of incremental warming probably causes more and more incremental harm as the emissions keep piling up. Adaptation becomes progressively more difficult at higher temperatures, societal disruption increases, and tipping points become more likely.

The harm caused by warming isn’t necessarily proportional to the change in temperature. We’ve warmed a little over one degree since the pre-industrial error, which has had noticeable impacts. But the preceding five or six degrees caused a truly radical change: the end of the last Ice Age. Thus, it seems likely that the more CO2 is already in the atmosphere, the more urgent it becomes to stop adding more. It’s something like bleeding: The more blood you’ve already lost, the more dangerous it is to lose more.

The following three italicized paragraphs unpack some of what I’ve just said. But if you’re not interested in the details, you can just skip down the page.

Except in extreme scenarios, every ton of carbon emissions has about the same effect on temperature, no matter how much carbon is already in the atmosphere. This is because of two offsetting effects. As the amount of atmospheric CO2 rises, the ocean warms and absorbs less of an additional ton, so more of it stays in the atmosphere. That will cause greater warming from each added ton of CO2 as CO2

builds up in the atmosphere.

This is offset, however, by another effect. As more CO2 builds up in the atmosphere, the effect of additional CO2 becomes muted because its absorption wavelengths become increasingly saturated, which decreases the warming effect of a given amount of additional atmospheric CO2. The two effects cancel each other out. The result is a roughly linear relationship between increments of CO2 emissions and temperature increases.

What makes it even more dangerous to keep adding CO2 is the likelihood that the amount of harm per additional ton goes up as the world gets warmer. It's not clear just how the shift from 0° to 1° of warming differs from the shift from 3° to 4°. We won't really know unless or until it happens , but we have every reason to think that the latter shift is much more damaging as changes to earth systems become more profound.

The fact is that we don't know just how quickly harm accelerates as the temperature warms. But at the very least, we can say this: Every additional ton counts, and the more CO2 is out there, the more risky it becomes to add more, as we move further outside the historical range of climates experienced by human societies. Paradoxically, the more miserably we've failed to date, the more urgent each additional ton of emission reduction becomes.

Churchill said during World War II that "we shall fight on the beaches, we shall fight on the landing grounds, we shall fight in the fields and in the streets, we shall fight in the hills; we shall never surrender." Today we might say, "We will fight emissions at 1.8 °, we will fight them at 2°, and 2.5 °, and 3.0 °; we will never surrender." The grandeur of Churchill's rhetoric gets lost along the way,, but the imperative is equally great. Future generations won't care how we *felt*, only how we *acted*.