

## 25. The "myth" of the boiling frog

Two frogs are **minding** their own **business** in the **swamp** when WHAM— they're kidnapped.

They come to in a kitchen, **captives** of a menacing chef. He **boils up a pot of water** and **lobs** one of the frogs in. But it's having none of this. The second its **toes** hit the **scalding** water it jumps right out the window. The chef **refills** the pot, but this time he doesn't **turn on the heat**. He **plops** the second frog in, and this frog's okay with that. The chef turns the heat on, very low, and the **temperature** of the water **slowly rises**. So slowly that the frog doesn't **notice**. In fact, it **basks** in the **balmy** water. Only when the surface begins to **bubble** does the frog realize: it's **toast**.

What's funny about this **parable** is that it's not **scientifically true**... for frogs. In reality, a frog will **detect** slowly heating water and **leap to safety**. Humans, on the other hand, are a different story. We're perfectly happy to **sit in the pot** and slowly turn up the heat, all the while **insisting** it isn't our hand **on the dial**, arguing about whether we can trust **thermometers**, and questioning— even if they're right, does it matter?

It does. Since 1850, global **average** temperatures have risen **by 1 degree Celsius**. That may not sound like a lot, but it is. Why? 1 degree is an average. Many places have already gotten much warmer than that. Some places in the **Arctic** have already warmed 4 degrees. If global average temperatures increase 1 more degree, the **coldest nights** in the Arctic might get **10 degrees warmer**. The warmest days in Mumbai might get **5 degrees hotter**.

So how did we get here? Almost everything that makes modern life possible relies on **fossil fuels**: coal, oil, and gas full of **carbon** from **ancient organic matter**. When we burn fossil fuels, we **release carbon dioxide** that **builds up** in our **atmosphere**, where it **remains** for hundreds or even thousands of years, letting heat in, but not out.

The heat comes from **sunlight**, which **passes through** the atmosphere to Earth, where it gets **absorbed** and **warms** everything up. Warm objects **emit infrared radiation**, which

should pass back out into space because most atmospheric gases don't absorb it. But greenhouse gases— carbon dioxide and methane— do absorb infrared wavelengths. So when we add more of those gases to the atmosphere, less heat makes it back out to space, and our planet warms up.

If we keep emitting greenhouse gases at our current pace, scientists predict temperatures will rise 4 degrees from their pre-industrial levels by 2100. They've identified 1.5 degrees of warming— global averages half a degree warmer than today's— as a threshold beyond which the negative impacts of climate change will become increasingly severe. To keep from crossing that threshold, we need to get our greenhouse gas emissions down to zero as fast as possible.

Or rather, we have to get emissions down to what's called net zero, meaning we may still be putting some greenhouse gases into the atmosphere, but we take out as much as we put in. This doesn't mean we can just keep emitting and sequestering all that carbon— we couldn't keep up with our emissions through natural methods, and technological solutions would be prohibitively expensive and require huge amounts of permanent storage. Instead, while we switch from coal, oil, and natural gas to clean energy and fuels, which will take time, we can mitigate the damage by removing carbon from the atmosphere. Jumping out of the proverbial pot isn't an option, but we can do something the frogs can't: reach over, and turn down the heat.