Photo by Tyler Clemens

Six Degrees of Desperation

We could have saved the Earth
but we were too damned cheap.
Kurt Vonnegut Jr.

SIX DEGREES DOESN'T SOUND LIKE much. When a warm front passes through your neighborhood, temperatures can swing by six degrees Celsius in an hour, and it hardly means the world is coming to an end.

But a rise of six degrees C in the earth's *average* temperature could very well mean just that, and it would certainly mean the end of life as we know it on our planet.

In fact, climate scientists warn that as little as half that much of an increase would create huge, potentially insurmountable challenges for our civilization, including massive crop failures; epic droughts, storms and flooding; devastating sea level rise; and hundreds of millions of permanent climate refugees.

We've already warmed the planet by a little over **1 degree** C (1.8 degrees F) since the beginning of the industrial age, and are experiencing the very unpleasant result.

Most notably—apart from more severe hurricanes and other extreme weather events—it is having a devastating effect on the world's coral reefs, 70% of which are dead or dying, and this in turn is having a catastrophic impact on the ocean's biodiversity and the marine food chain.

Land-based agriculture is also impacted. For every degree of warming, agricultural yields are expected to decline by about 10%, a potentially famine-inducing loss in a world of steadily increasing population. (6,000 years ago, when temperatures were about one degree warmer in North America, the fertile Great Plains of the US looked much like the Sahara Desert does today.)

The world is already committed to at least a **1.5 degree** rise, which climate scientists warn is the maximum tolerable. At the current rate, we will hit that target sometime around the year 2030, after which it will rapidly vanish in the rear-view mirror.

A more realistic 'fallback target' of about **2 degrees** by 2040 is already being mooted, but two degrees of warming is enough to eventually completely melt the Greenland ice sheet, causing a rise in sea levels of as much as 7 meters (23 feet) and forcing the relocation of more than a billion people.

2 degrees may also cause enough acidification to render large parts of the world's oceans toxic to plankton, the basis of the marine food chain, and cause the extinction of a third of all land-based species. (Surface temperatures last exceeded pre-industrial levels by 2 degrees 2.6 million years ago.)

More ominously still, scientists fear that a rise of as little as 2 degrees may be enough to begin triggering negative feedback loops, resulting in a 'hothouse Earth' scenario, which would all but guarantee another full degree or more of warming. But barring an extraordinary global effort to reduce carbon emissions, the world is on track for at least 2 to 3 degrees of warming by 2100.

At **3 degrees**, the climate will likely reach a 'tipping point', where warming starts to run out of control, leaving us powerless to further intervene. (For example, the Amazon rainforest would be in danger of burning down in a firestorm of epic proportions, and carbon released by the burning could boost temperatures by a further 1.5 degrees,)

4 degrees average warmer temperatures is something the world has not seen in over 15 million years. By 4 degrees of warming, the Arctic ice cap will have disappeared, along with much of the Antarctic ice sheet. Much of the 500 billions tons of methane (20 times more toxic than CO^2) locked up in Siberian permafrost is likely to be released.

Beyond 4 degrees, climate models describe a radically different Earth, with a return to our familiar, life-sustaining world rendered all but impossible. Potentially, it could even portend a complete collapse of civilization.

The last time the world was **5 degrees** warmer—during the Paleocene, 55 million years ago—a sudden release of methane hydrates in the world's oceans is believed to have killed 97% of all life on Earth.

Even a rise of **6 degrees**—last seen 251 million years ago—is not out of the realm of possibility within a few centuries, and the consequences would be unimaginable. Hydrogen sulfide, sulphur dioxide and other toxins would kill most remaining life and destroy the ozone layer, exposing survivors to deadly levels of UV radiation. The atmosphere itself could be ignited by lightning.

Some climate models predict that if all known fossil fuel reserves are exhausted and CO^2 emissions continue unabated, a rise of even as much as **12 degrees** is possible, (At 12 degrees, more than half of any remaining human survivors would cook to death outside within a few hours.)

The great tragedy is that the most severe outcomes described above are still largely—perhaps even entirely—preventable, but the window of opportunity to change course is rapidly closing. We have the money, technology, and time to save ourselves, as well a large portion of the multitude of other species we share this planet with.

Rather than simply give up—and curl up in a fetal position like the victims burnt and buried under volcanic ash at Pompeii—we'd be better advised to stop, look up, and mind the gathering dark clouds. ■