

# Methane — a mysteriously mighty molecule

Lisa Margonelli, Zócalo Public Square, 2-9-16

Methane is a democratic molecule.

You make it, I make it, cows and coal mines and multinational oil companies emit it. When NASA looks for life on other planets, they scan for methane, not little green men.

Methane is the ultimate sign of life — an invisible one. The mysteries surrounding methane remind us that we barely know our own planet.

For as long as we've had an oil and gas industry, we've had methane leaks from pipeline and equipment, but they just drifted away and were barely regulated. All that changed Oct. 23, when the Southern California Gas Company announced that a storage field in the Los Angeles community of Porter Ranch was leaking.

Many residents did not know they lived on one of the largest of the country's 400 underground storage areas for natural gas, which is mostly composed of methane. But soon residents smelled the rotten egg odor of mercaptans, the stinky scent added to the naturally odorless gas to alert people to leaks. Children began having nosebleeds. Five thousand homes were evacuated and the governor declared a disaster. To date, the leak has spewed more than 90,000 metric tons of methane and produced an invisible plume of methane (seen only with an infrared camera) more than a thousand feet tall.

It wasn't until 1976 that scientists realized that methane's ability to reflect some infrared radiation means it's a very powerful greenhouse gas. Over a hundred-year period, a molecule of methane will trap 34 times as much heat as a molecule of carbon dioxide emitted to the atmosphere, according to EPA. Then, in the mid-1980s, scientists found that methane forms an exotic, flammable ice undersea and in some permafrost. The stuff is called methane hydrate, and at low temperatures and high subsea pressures a molecule of methane will sit in a little "cage" of water molecules.

These cages can hold methane for millions of years. But if they get hit, say by an earthquake, they can burp up a lot of methane in an instant, causing a tsunami. We don't know how much methane hydrate is out there, but probably a lot. The highest estimate is that hydrates contain three times more carbon than all the conventional fossil fuels on Earth.

During recent periods in our planet's history, methane hydrate ice mounds seem to Hoover up methane in sediments and hold on to it — which undoubtedly kept our atmosphere cooler, says Rice University's Gerald Dickens. But in the deep past, hydrates have released more methane, accelerating warming in the atmosphere. If the oceans continue to warm over the next several hundred years, our big stash of hydrates could work the other way, releasing methane and accelerating warming.

It's unsettling to think we've only come to grasp the power of methane in the last generation. Can you imagine if we'd discovered the role of the polar ice caps in the climate after we went to the moon?

In the scheme of the planet's enormous methane budget, the Porter Ranch spill stands out because it's visible. (For comparison, the 2010 Deepwater Horizon spill released six times as much methane underwater as the Porter Ranch spill has; but we remember the spill for the 5 million barrels of oil it released.) Now California must figure out how to regulate methane. In August the EPA proposed rules for new oil and gas equipment. But all of this won't fix our leaks, which the Clean Air Task Force estimates come largely from older equipment.

Gradually, the human consciousness of the powers of methane and our climate priorities will come to our machines and policies. Undoubtedly, our great grandkids will think it's funny that we knew so little about methane.