Probing Question: Are we running out of helium?

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Party planners, take note: the atmosphere may become a little deflated at gala events in the future. Some scientists are sounding the alarm about the wastefulness of using helium—a rare, non-renewable gas—to fill party balloons. Why? As an essential resource in technologies such as medical imaging, rocket engines, and surveillance devices, it turns out that helium does a lot more than give our balloons a lift. And despite being the second most abundant element in the universe, most of our supply in the Earth's atmosphere simply floats off into space and is lost.

Are we running out of helium on Earth?

Moses Chan, Evan Pugh Professor of Physics at Penn State, explains that the world's supply of helium is a byproduct of natural gas production, with the Texas Panhandle arguably being the helium capital of the world. However, says Chan, "Very few natural gas wells in the world have enough helium in the well to make it economical to separate helium from natural gas. The gas wells with the most helium have only about 0.3 percent, so it is in short supply."

In response to the element's scarcity, the United States has been stockpiling helium since the 1960s in a National Helium Reserve called the Bush Dome, a deep underground reservoir outside of Amarillo, Texas. By the mid 1970s 1.2 billion cubic meters of the gas was stored there. The current reserve is approximately 0.6 billion cubic meters, or roughly 4 times the current world market.

But, Chan notes, in 1996 the Helium Privatization Act mandated that the Department of the Interior sell off all the stockpiled helium by 2015. "As a consequence," he says, "the United States government is selling the equivalent of 40 percent of the world market of helium at a below-market price."

"This action discourages the active exploration of helium," Chan explains, "since companies can buy it from the United States at a cheap price and sell it at a premium." Chan, who served on the National Research Council's Committee on Understanding the Impact of Selling the Helium Reserve and co-authored its report, adds that the shortages in the last couple of years are also due to the small number of helium plants worldwide (12 at last count) and maintenance and construction problems in plants in Qatar, Algeria, and the United States.

In May of 2012, Chan testified before the Senate Committee on Energy and Natural Resources, and pointed out that, in recent years, over 20 prominent research programs at universities and national laboratories had reported shortages of liquid helium, impeding research, sometimes for extended periods.

The solution, he believes, may involve new legislation that allows the Bureau of Land Management to continue to manage the Federal Helium Reserve beyond 2015 to avoid any sudden disruption of the market. "There should be a plan to gradually reduce and curtail the sale of the federal helium for industrial and recreation use," says Chan. "But the federal reserve helium should continue to be made available for national strategic and scientific needs at a price that is in the national interest. When the federal helium is no longer available for non-strategic industrial use," Chan adds, "the market price of helium will likely go up and there will be more incentive for the gas industry to explore new gas wells with helium." Rising prices might also mean "the industries that rely on helium—semiconductor, fiber optics, welding, etcetera—will

start to conserve and recycle it."

It should be noted, he adds, that natural gas from the Marcellus shale has no helium because the rocks are porous and any helium that was once there leaked out a long time ago.

"Although scientific use accounts for only 3 percent of all the helium, for scientists who want to cool their experiments to cryogenic temperature, there is no alternative to liquid helium," concludes Chan. "For MRI machines that need a stable high magnetic field, there is also no alternative. It is estimated that if cost was not an issue, the amount of helium gas trapped in current and future gas wells worldwide could last between 200 or 300 years." That would buy us some time to figure out how to ensure helium sticks around. However, brace yourself for costs to soar "very high," he predicts. How high? "It depends on how quickly all major helium users adopt ways to conserve and to recycle. When the current helium-rich gas wells are used up, the price could easily soar tenfold."

With that kind of ballooning inflation, it seems likely that we'll be inflating far fewer balloons.

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