

# Managing the Helium Reserve: Auctions are the Best Way to Allocate Scarce Resources

BY JOSEPH V. KENNEDY | SEPTEMBER 2013

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*In order to maximize revenues and give private markets time to adjust, the government should auction off its remaining helium reserves over a 10-year period.*

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The Helium Program is currently scheduled to begin shutting down on October 1. This would reduce domestic supply by over 40 percent, forcing scientific and industrial users to adjust to sudden shortages and high prices, and idling an extremely valuable public resource. In order to avoid this situation Congress quickly needs to pass legislation that gradually auctions off the remaining reserves over the next 10 years. This will maximize federal revenues and give private markets time to adjust to the depletion of the Reserve.

## INTRODUCTION

Helium has several unique properties: it is much lighter than air, it is inert, and it has the lowest melting and boiling points of all elements. Because of these traits, refined helium has important uses in a wide variety of scientific and industrial processes.<sup>1</sup> Most helium is produced as a derived product of natural gas from fields with a relatively high proportion of helium in them. Assuming that the price of helium is high enough, it can be worthwhile for the gas producer to separate this helium out. Presently, however, sales from the federal Helium Reserve account for over 40 percent of domestic supply.

Major uses of helium include industrial cryogenics, semiconductor production, optical fiber manufacturing, magnetic resonance imaging, metal welding, and space and defense rocket maintenance. These are high-value activities, many of which have few or no viable alternatives to helium. Thus a sudden large decrease in supply would have serious economic consequences. consequences would be especially severe since the world is currently experiencing a relative shortage of helium.

## HISTORY OF THE FEDERAL HELIUM RESERVE

The history of the Helium Reserve provides a good example of why the government should be cautious about interfering with private markets. Although the program has occasionally changed in response to market realities, the response has always been delayed and, in each

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case, the assumptions behind the new reforms proved to be incorrect, leading to serious market imbalances.

The government's involvement in producing and stockpiling helium began to grow in the early 1920s. At the time, helium blimps looked like they would have significant military uses. The Helium Act of 1925 gave the government responsibility for producing and storing helium from federal lands.<sup>2</sup> From 1937 to 1960, the U.S. Bureau of Mines was the nation's sole producer of helium.

Under the Helium Act Amendments of 1960 the helium program began acquiring and storing helium from private suppliers, financing these purchases with loans from the government. The 1960 Act required that the price of any helium sales be sufficient to cover all of the program's costs, including interest on the program's debt. Few sales occurred at this price. As a result, the government reserve grew and the program accumulated a debt of about \$1.3 billion, the vast majority of which was interest. By 1973 the stockpile, then 35 billion cubic feet, greatly exceeded demand, then 650 million cubic feet annually. The government stopped buying helium and from 1973 to 1996, additions to the Reserve roughly matched withdrawals, so that the size of the Reserve did not change.<sup>3</sup>

The Helium Privatization Act of 1996 changed the program again. The government got out of the business of refining helium.<sup>4</sup> The Act also directed the Department of the Interior to sell off all but 600 million cubic feet of the Helium Reserve by 2015 on a straight-line basis. The Act set a minimum price on sales based on the price needed to pay off the debt owed to the government.

The 1996 Act had several unfortunate results. The straight-line requirement gave the program no flexibility to respond to temporary market situations such as the current shortage. The large size of the Reserve caused government sales to dominate domestic and world markets, currently accounting for over 40 percent of domestic supply. The minimum price set by statute was initially significantly higher than that of private suppliers. The National Research Council found that private suppliers quickly raised their prices to match or exceed the government's. Having set an artificial price, the NRC concluded that in recent years the government was selling helium below the market price. This had the effect of encouraging inefficient uses and discouraging new sources of supply.<sup>5</sup>

The 1996 Act has had the intended effect of reducing the Reserve. In recent years, the program has been selling 2.1 billion cubic feet from the Reserve each year. On September 30, 2013 approximately 9.1 billion cubic feet will remain in the reserve. Thus, at current rates, the Reserve will be depleted in less than 5 years. Unfortunately, the 1996 Act terminates the helium program when the proceeds from private sales are sufficient to pay back the program's debt rather than when the stockpile is depleted. The Bureau of Land Management estimates that it will make the last payment on October 7. In order to preserve assets, it plans to begin the shutdown process on October 1 unless Congress acts. This will mean that approximately 9 billion cubic feet of helium will be unutilized.

## **THE RIGHT POLICY GOING FORWARD**

Virtually everyone agrees that the currently scheduled shutdown should be avoided. The 1996 Act linked the program's shutdown to final repayment of the debt on the mistaken assumption that this would also mean that the reserve had been depleted. Since the Reserve

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still has a surplus of helium for sale, it makes no sense to cease operations and leave that helium unused.

There are several reasons why the current situation is bad. First, even if Congress passes legislation to allow sales to resume, the current formula links the price to the need to pay off an old intergovernmental transfer of funds rather than to any indication of market need or availability. Artificial deviations such as these in market prices usually bring about either shortages or waste.

Second, ending the program will leave a valuable public resource unutilized for the indefinite future. Continued sales would allow taxpayers to recoup at least part of their past investment in the reserve and would lower the budget deficit.<sup>6</sup>

Finally, the sudden fall in market supply from a shutdown will impose significant costs on current users. Private suppliers are normally very good about finding new sources of supply and alternative resources when prices rise. Similarly, buyers cease low-value uses and become more efficient. However, this process requires time. In the short-run both supply and demand may be unable to respond, leading to high prices and inefficient rationing.

Ending the program now would be especially troublesome because the world is in the midst of a temporary shortage of helium. The reasons include a significant increase in global demand, maintenance issues at international plants in Qatar, Algeria, and Australia, delay at a new plant in Wyoming, and the recent drop in natural gas prices, which has reduced gas production, of which helium is a by-product. The impact of these causes will fade in time, but now is not the time to cut supply even further.

Both the House (H.R. 527) and the Senate (S. 783) have proposed legislation extending the helium program. The House passed its legislation back in April. On September 19th the Senate passed the House bill but only after substituting its language as a substitute. The legislation will now either need to be passed as is by the House or a compromise version capable of passing both chambers must be found.

The Council for Citizens Against Government Waste (CCAGW) has recently argued that the current legal authority should merely be extended, allowing the government to continue making sales under the formula set by the 1996 Act.<sup>7</sup> The problem with this is that the 1996 formula was never linked to market reality. It was determined by the price needed to repay the debt that the government owed itself rather than the desire to maximize the value of the resource.

In an ideal market price is a function of both the cost of production and the value to consumers. A price is set where total demand equals total supply. At this level, prices equal both the marginal cost of production and the marginal utility of consumption. However, because helium is a co-product of natural gas production, private supplies depend heavily on natural gas prices, especially in areas with helium-rich deposits. Reserve sales are even more removed from the cost of production and, since 1996, have been set in a fairly artificial manner.

Linking the sales price to an artificial formula creates inefficiency. Setting the price too low reduces government revenues. More important, some of the helium will go to uses that are

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not very important, wasting economic resources and possibly leading to shortages later on. The private market will also lack incentives to conserve use and find new sources of supply.

Setting the price too high might benefit taxpayers in the short run as revenues increase. But it imposes another cost to society because some valuable uses of helium will be foreclosed. There is also a risk that private parties might invest resources in finding new sources of supply, only to lose out when the price inevitably collapses.

In the absence of production costs as a guide, auctions are generally the best means of determining a market price. Auctions ensure that the resource is devoted to those who value it most highly and, once the sale is made, they ensure that the buyer has an incentive to continue to use the resource optimally. They also do the best job of maximizing government revenue. As a result, auctions have been widely used to allocate public radio spectrum to the private sector. These auctions have produced significant revenues for the government while helping to ensure that wide areas of spectrum are used as efficiently as possible.

However, rather than continuing the present volume of sales, it would be better to establish a schedule for selling the Reserve off over a period of no more than 10 years. But rather than sell fixed volumes each year, it would be more efficient to have annual sales decline over time. This would give the private sector incentives to produce more and, if need be, use less. Moreover, according to the National Research Council, reducing volume over time also maximizes the total amount of helium recoverable from the Reserve.<sup>8</sup>

It is not clear whether gradual sales would increase or decrease total auction revenues. They would, however, give the private sector time to adjust to a significant decrease in supply. This decrease is inevitable whether the program is halted now, sales continue at their present pace until the reserve is depleted, or they are gradually auctioned off. But managing the decrease is likely to reduce the costs of market disruption. This should provide the private market with enough certainty and time to enable it to respond in a timely manner.

Over the longer-term there is less reason to worry about the strategic value of helium. The government certainly has not done a good job of predicting market supply or demand. More generally, the price of commodities tends to fall over time. This effect may be reduced if producers have market power, such as the OPEC nations do. It is also true that the price of many commodities has jumped due to the growing demand in developing countries. Over the long-term, however, the steady decline in prices is likely to reassert itself, making the Reserve less valuable and easing the fear of shortages.

Users of helium can perhaps take some comfort from the recent experience of rare earth materials. Mercantilist-inspired supply restrictions by China led to a fear of shortages and rising prices. Notwithstanding some near-term shortages, since then the world has seen an increase in the sources of supply and a growth in alternatives.<sup>9</sup> Likewise, managed the right way, by relying more on market forces, the federal government can end its involvement in helium markets within a decade, raise revenues to reduce the budget deficit and do so in a way that limits U.S. economic disruption to critical technology-based industries.

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## ENDNOTES

1 This paper addresses helium-4, the most common isotope of helium. Helium-3, a rarer isotope is also extremely valuable in a variety of security and scientific purposes. The main source of helium-3 is from the government's nuclear programs in which tritium degrades slowly into helium-3. Some helium-3 is contained in the government's helium reserve and in the atmosphere, but it is not economical to separate it out.

2 Pub. L. No. 68-544, 43 Stat 1110 (1925). The laws governing the helium program are currently codified at 50 U.S.C. §§ 167-167m.

3 National Research Council, *Selling the Nation's Helium Reserve*, pp. 23-24.

4 Helium separated from natural gas is still in a crude form and is stored that way. When helium is sold from the Reserve, it still needs to be refined before it can be used. Four private companies currently have refineries attached to the Reserve.

5 *Selling the Nation's Helium Reserve*, p.97.

6 This paper is mainly concerned with the proper management of the Helium Reserve. It does not address the current controversy over whether the proceeds of any government sales should be devoted to deficit reduction or to other social purposes.

7 <http://cagw.org/helium> (accessed September 21, 2013).

8 National Research Council, *Selling the Nation's Helium Reserve*, (2010) pp. 111-12.

9 See, Mark Piesing, "Rare-earth Mineral Substitutes Could Defeat Chinese Stranglehold," *Wired*, July 31, 2013, <http://www.wired.co.uk/news/archive/2013-07/31/race-for-rare-earth-minerals>; Associated Press, 'Jamaica Breaks Ground on Pilot Project to Possibly Extract Rare-Earth Elements from Red Mud, February 4, 2013, <http://www.foxnews.com/world/2013/02/04/jamaica-breaks-ground-on-pilot-project-to-possibly-extract-rare-earth-elements/>



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