Desert Mountain Energy Corp.

DME.V, DMEHF

May 25, 2022

Desert Mountain Energy - Zero-Carbon Helium

Desert Mountain Energy Corp. (DME) is an award winning[1] helium, hydrogen, and rare earth gas exploration company headquartered in Vancouver and operating in Arizona. DME has 85,000+ acres of mineral leases in the Holbrook Basin, Northeastern Arizona. DME is expected to be in production of refined helium within four months[2]. The capital structure as of March 12th, 2022 is:

Shares Issued & Outstanding	74,488,988
Options	6,812,500
Warrants	671,326
Fully Diluted	81,972,814
Recent closing price (May 20th, 2022)	$3.20 CAD
Fully Diluted Market Cap (May 20th, 2022)	$262M CAD
Cash (April 5th, 2022)	$18M

CEO Robert Rohlfing is an experienced oil and gas industry operations executive with a strong geological background and over 25 years experience in formulating, conducting and managing successful exploration, drilling, development and production programs for oil, gas, and minerals worldwide.

President Don Mosher has 35 years of experience in corporate finance, business development, management and marketing. He has served on boards and management

teams of many publicly traded companies, advising companies on marketing, financing and corporate strategies.

Desert Mountain Energy has high insider ownership. 8.8M common shares and options for common shares are owned by the management team (~10.7%).[3][4]

Led by Robert Rohlfing and Don Mosher, Desert Mountain Energy has successfully explored for, identified, and drilled for helium. DME has drilled seven wells to date (2020-22). Four were wildcat wells (exploratory wells unproven or high-risk areas); all have commercial helium shows. Well #3 was subject to litigation by the City of Flagstaff until March 2022 (resolved in favour of DME[5]); its contents have not yet been disclosed. Three wells were offsets to Well #4 in the McCauley Field. Reported results from Wells 1, 2, 4, and 5-7[6] are as follows:

Well #	Flow Rate in MCFGPD	Helium %	Nitrogen %	CO2 %	Methane & Other %
1 (State 10-1)	24,214	**7.1321**	77.0837	4.0183	2.6512
2 (State 16-1)	1251.2	**4.0904**	90.2742	0.0063	3.5535
4 (Chevlon 11-1)	1587	**1.137**	94.6536	0.1428	4.0666
5-7	Unspecified	**3.511**	96.4689	0.0201	0

“Generally, natural gas containing more than 0.3 percent helium is considered economic for helium extraction in the United States, although the economics of helium extraction often depend on the other products in a natural gas stream.”[7] High-grade helium is considered to be concentrations of 1.5% or higher.[8] Note the insignificant concentrations of carbon-based gases from the DME wells. The small percentage of carbon-based gases will allow DME to produce zero-carbon helium and store the hydrocarbons for backup power generation.

Helium is a critical gas for cryogenic and inert atmosphere applications. Helium has unique properties that cannot be satisfied with an alternative gas. Traditional uses remain while demand for helium has expanded with many high-tech applications. Some uses include[9][10]:

- The manufacturing of fibre optics
- Cooling of magnets in MRI machines (biggest use case at present time)
- EV's; the liquid hard drives require helium
- Semiconductor manufacturing
- Space exploration; used to purge the rocket engines prior to take-off
- Welding (as a shield gas in stainless steel, aluminum, and CO2 laser welding[11])
- Leak detection
- Analytical and laboratory applications

For roughly the last century the United States Bureau of Land Management (BLM) has managed the Federal Helium Reserve in Amarillo, Texas.[12] The following excerpts from a statement by Timothy R. Spisak at a 2013 U.S. oversight hearing outline a brief history of helium production in the United States:

> The BLM plays a key role in the careful management and stewardship of the only significant long-term storage facility for crude helium in the world, known as the Federal Helium Reserve (Reserve), which supplies approximately 42 percent of domestic demand and approximately 35 percent of global demand for crude helium.
>
> Because of helium's potential to lift military reconnaissance devices high above battlefields, the Federal government's interest in the resource dates back to World War I. Recognizing this key military use for helium, the Mineral Leasing Act of 1920 reserved to the Federal government all helium produced on Federal lands—a reservation that remains in effect today. After WorldWar I, recognition of the potential for helium recovery in the Texas Panhandle, Western Oklahoma, and Kansas area (collectively, the "Hugoton" field) led to the development of the Federal helium program focused in that area. In 1929, the Bureau of Mines built the Amarillo Helium Plant and Cliffside Gasfield Facility near Amarillo, Texas, to produce helium-bearing natural gas from a naturally occurring geologic field known as the Bush Dome Reservoir
>
> After World War II, Federal use of helium shifted toward applications related to space exploration, and in 1960 Congress passed the Helium Act Amend-

> ments of 1960. This Act changed the program's mandate from exclusive government production of helium to conservation of the resource.
>
> Congress subsequently passed the Helium Privatization Act of 1996 (HPA), which required the BLM…to make available for sale the vast majority of the stockpile of crude helium…The HPA mandated the BLM to make available for sale all of the helium in excess of a 600 million scf permanent reserve. Additionally, the HPA required the BLM to cease all helium production, refining, and marketing activities to effectively privatize the refined helium market in the United States. Finally, the Act provided for the NAS to review the impacts of the 1996 Act. The NAS published its first study in 2000, and released a follow-up report in 2010.[13]

In April 2020 the BLM outlined their adherence to the Helium Stewardship Act of 2013:

> The Bureau of Land Management today announced the process and timeline by which remaining helium and helium assets will be disposed of in order to meet the requirements of the Helium Stewardship Act of 2013. In accordance with that law, the BLM will no longer manage the Federal Helium System (including the Federal Helium Reserve) as of Sept. 30, 2021.
>
> Any excess helium and helium assets remaining on that date will be transferred to the General Services Administration (GSA), which will follow its statutory disposal process. Federal In-Kind users will continue to have access to helium until September 30, 2022, while the GSA completes their disposal process. This will also allow the BLM to continue operations until such time as all privately owned helium is produced from the field (about 2023).[14]

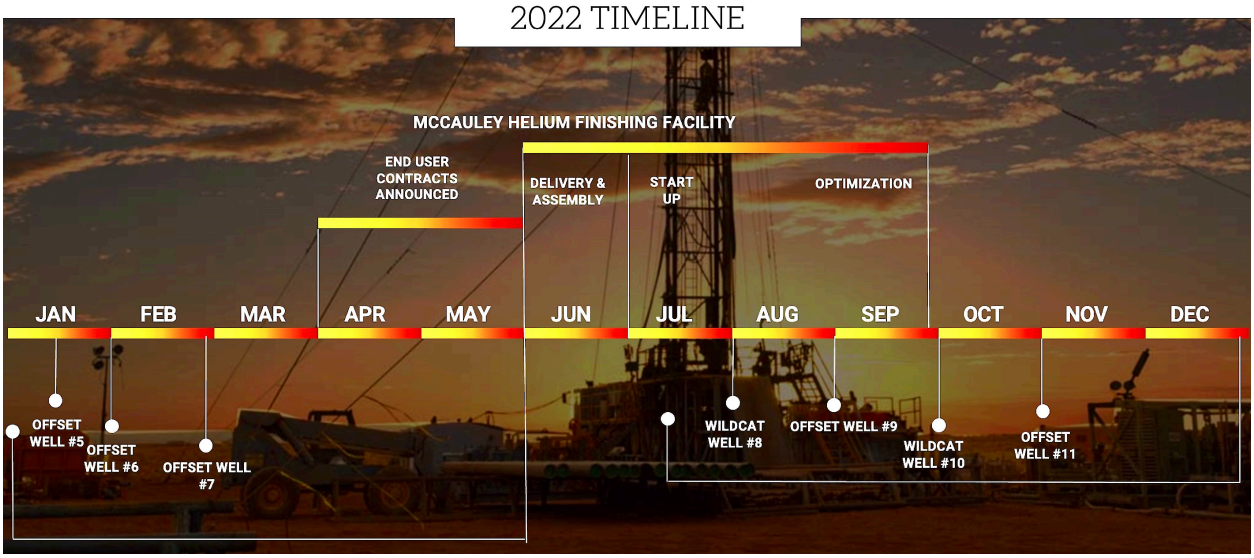
The exit of such a large supplier of helium from the helium markets has led to significant upward pricing pressures and numerous shortages over the last decade.

More recently, Desert Mountain Energy provided details about an emerging helium supply crisis[15] in an April 5th, 2022 press release[16]:

> CRITICAL GLOBAL HELIUM SHORTAGE:
>
> 1 The Russian Amur Complex fires and explosion has removed a projected source of up to 25% of global helium demand.
>
> 2 The US Government (BLM) has suspended production at their Amarillo, TX plant that operates and maintains a helium storage reservoir, enrichment plant, and pipeline system. This plant was responsible for over 40% of the domestic demand for helium.
>
> 3 Helium sources from Algeria and Qatar have also had issues.
>
> * Due to this critical shortage, the Specialty Gas Suppliers have declared Force Majeure and cancelled all supply contracts resulting in helium increasing 300% in price over the last 6 weeks.

Helium markets are opaque and pricing is tough to precisely determine. Raw helium gas pricing was about $80/MCF (MCF = one thousand cubic feet) in ~2005 and was about $350/MCF leading into the recent crisis[17][18]. Based on the April 5th DME press release, refined helium is currently selling for at least $2000/MCF and possibly upwards of $4000/MCF, while raw helium gas is selling for $650-$1000/MCF. The refined price of helium is the relevant market price to DME because the company is building a finishing facility to refine its own helium to 99.99%+ purity[19]. The company will capture the margin on the refined helium gas by selling directly to end users from a spigot at the McCauley finishing facility. End-users will pick up the helium themselves with their own trucks, saving DME $7M USD in capital expenditures on building out their own fleet of trucks[20]. The company has identified 27 end-users within 400 miles (May 2021). Being close to end users is important. On a hot day a tractor-trailer with a gaseous helium payload can lose as much as 1% per 100 miles travelled.[21] Details of the end-user contracts should be announced shortly according to the timeline given by the company in their investor presentation.

From the company's investor presentation[22], the following are Desert Mountain Energy's general timeline and plan to production for 2022:



Plan to Production

- Drill Wells #5, #6 and #7 in the McCauley Helium Field
- Drill wildcat Gunnar Dome Well
- Announce end-user contracts
- Delivery and assembly of the McCauley Helium Finishing Facility
- Startup and production from wells #2, #4, #5, #6 and #7 in the McCauley Helium Field by the end of Q2 in 2022
- Optimize McCauley Helium Finishing Facility
- Drill additional wells
- Pre-order components for the Rohlfing Helium Field
- Bring on 60 to 70 new helium wells over a 5 year period

Desert Mountain Energy is close to finishing assembly and initializing their McCauley helium finishing facility, supplied primarily from the McCauley helium field. The company estimates the cost of this facility, which will be powered by a solar farm, at $7M USD. The input capacity of the McCauley finishing facility is expected to be 10,000MCF/day (unconfirmed) and the company intends to sell purified Helium that is between 99.99% and 99.9999%[23]. “Final purification of helium, prior to liquefaction, is typically done using either (a) activated charcoal absorbers at liquid-nitrogen temperatures and high pressure or (b) pressure-swing adsorption (PSA) processes. Low-temperature adsorption can yield helium purities of 99.9999 percent, while PSA processes recover helium at better than 99.99 percent purity.”[2425] DME has communicated that they plan to feed Wells #4 (1.137% He), #5-7 (3.511% He) along with one pay zone from Well #2 (4.171% He) into the McCauley finishing facility. The only announced cus-

tomer at the time of writing is the US Government[26]. With these constraints, some rudimentary revenue/profit projections can be made.

All cases are based on 5 wells averaging 3.0% helium and 300 days of production per year. USD = 1.25CAD. Profit margin of 85%. Reported flow rate of well 2 = 1251MCFGPD. Reported flow rate of Well 4 = 1587 MCFGPD. Assumed flow rate of 1500 MCFGPD on offset wells 5, 6, and 7 (no data).

Case	Draw Rate per well in MCFGPD	Refined Helium Price Obtained (USD/MCF)	2023 Revenue in Millions (USD)	2023 Revenue in Millions (CAD)	Profit per diluted share (85% Margins) (CAD)
Bear	500	2000	45	56.25	**$0.58**
Base	1000	2000	90	112.5	**$1.16**
Bull	1000	3000	135	168.75	**$1.75**

In all cases refinery utilization is at 50% or less of input capacity which allows Desert Mountain Energy to further expand input by drilling more offsets in the McCauley field. The company has indicated two more offsets will be drilled this year however it is unclear if these offsets are going to be drilled in the McCauley field. Profit margin is a wildcard; 85% margins are somewhat optimistic and include no consideration for future capital expenditures. Expected draw rates from the wells are also unclear. In the proposed bear case, DME currently trades at a forward P/E of 5.5 with only the five wells entering production (60+ wells expected over the next 5 years). Consider Discovery Well #1 in the Rohlfing field with 7.1321% Helium and 24,124 MCFGPD flow rate. Well #1, at 20% of the reported flow rate and $2000/MCF for refined helium, would produce more revenue than the proposed bull case from the five wells that are being taken into production this summer.

In the context of the Rohlfing field being undeveloped, Well #3 recently exited litigation in favour of DME, and two more wildcat wells planned for this year will optimistically uncover two new helium fields; the outlook for Desert Mountain Energy as an investment is favourable.

Desert Mountain Energy has a few other potential revenue sources: Helium-3, hydrogen, and rare earth gases. Helium-4 is the abundant isotope of helium. Helium-3 is an ultra rare isotope of helium that has primary uses in thermal neutron detection, ultra-low temp cryogenic research (as low as 1mK)[27], and as a fuel for nuclear fusion reactors. Thermal neutron detection is of high importance for national security: detection of nuclear materials smuggling. A crisis of helium-3 supply in 2010 was a direct consequence of nuclear disarmament and non-proliferation agreements that reduced nuclear stockpiles[2829]. Helium-3 is typically produced by capturing the decay products of Tritium (12.3 year half-life) which is used as a yield booster in nuclear payloads. During this crisis He3 prices went as high as $55M[30] per MCF and have since fallen to about $5.5M per MCF today (~$1400/gram!)[31]. DME CEO Robert Rohlfing made some interesting comments last year about the presence of Helium-3 in DME wells.[3233] While speculative, the presence of an ultra rare and ultra critical gas would be an incredibly accretive asset. Concentrations as low as 1ppm He3 can be separated while 10ppm is considered robustly economic.[34]

Desert Mountain Energy has also announced a discovery of a hydrogen field (3.832% H2 in Well #4) within the McCauley field.[3536] Company executives have indicated in interviews that the company has also found trace amounts of rare earth gases (noble gases) in Wells #1 and #2. The decision was made to take the McCauley field

into production due to the simple composition of the gas in the field, which makes it cheaper and easier to refine compared to the gas in the Rohlfing field.[37] The cash flow from production in the McCauley field will be used to fund DMEs operations including capital expenditures on a more complex refinery for the Rohlfing field that is able to deal with any rare earth gases. The company "is confident in achieving positive cash flow without further financing".[38]

Desert Mountain Energy Corp., set to enter refined helium production within the next four months, is an attractive business that has low costs of production and very high margins on an irreplaceable commodity that is in a global supply crisis.

Additional Resources

- DME President Don Mosher Interview May 2021: https://www.youtube.com/watch?v=b60t9MgHZhg
- DME President Don Mosher Interview Jan 2022: https://www.youtube.com/watch?app=desktop&v=LEOIxAHqC1I
- Operational Costs of He3 Separation Using the Superfluidity of He4: https://www.mdpi.com/1996-1073/13/22/6134/htm
- Interview with DME CEO Robert Rohlfing summer 2021 with Helium-3 comments: https://youtu.be/ab7zx8ql82k?t=485
- Jan 2021 Annual Shareholder meeting video: https://www.youtube.com/watch?app=desktop&v=nrQq6eXtImA
- https://www.reddit.com/r/DesertMountainEnergy/
- Helium Exploration & Exploitation Holbrook Basin, Arizona - Arizona Geological Survey - University of Arizona: https://youtu.be/aYsmJLORWD0
- National Academy of Sciences Helium Reports: Selling the Nation's Helium Reserve (2010), The Impact of Selling the Federal Helium Reserve (2000)

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Disclosure: I have a beneficial long position in the shares of one or more of the companies discussed in this article, either through stock ownership, options, or other derivatives. I wrote this article without external assistance, and it expresses my personal opinions. I was not compensated for this article, and I have no business relationship with any company whose stock is mentioned in this article.

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[1] https://www.desertmountainenergy.com/desert-mountain-energy-has-been-awarded-best-helium-exploration-and-development-company-north-america/

[2] https://www.desertmountainenergy.com/wp-content/uploads/2022/05/Investor-Presentation_05122022.pdf (Slide 8)

[3] https://www.desertmountainenergy.com/about/#team

[4] https://www.sedi.ca/sedi/

[5] https://www.desertmountainenergy.com/arizona-appellate-court-rules-unanimously-in-favor-of-desert-mountain-energy-corp-vacates-superior-court-order/

[6] https://www.desertmountainenergy.com/wp-content/uploads/2022/05/Investor-Presentation_05122022.pdf (Slides 9-11)

[7] "4 Helium Supply, Present and Future." National Research Council. 2000. The Impact of Selling the Federal Helium Reserve. Washington, DC: The National Academies Press. doi: 10.17226/9860.

[8] https://resourceworld.com/desert-mountain-energy-announces-helium-discovery-on-well/

[9] https://youtu.be/b60t9MgHZhg?t=430

[10] https://youtu.be/zZKRnTMXRAU?t=366

[11] https://www.thefabricator.com/thefabricator/article/consumables/whats-up-with-helium-for-welding-applicationsr

[12] https://www.blm.gov/programs/energy-and-minerals/helium/federal-helium-program

[13] https://www.doi.gov/ocl/hearings/113/americasheliumsupply_071113

[14] https://www.blm.gov/sites/blm.gov/files/BLM%20NM%20Helium%20Press%20Release%20April%2016%202020.pdf

[15] https://physicstoday.scitation.org/do/10.1063/PT.6.2.20220404a/full/

[16] https://www.desertmountainenergy.com/desert-mountain-energy-corporate-update/

[17] https://www.bluestarhelium.com/helium/market/

[18] https://youtu.be/b60t9MgHZhg?t=364

[19] https://youtu.be/zZKRnTMXRAU?t=534

[20] https://youtu.be/b60t9MgHZhg?t=413

[21] https://youtu.be/b60t9MgHZhg?t=125

[22] https://www.desertmountainenergy.com/wp-content/uploads/2022/05/Investor-Presentation_05122022.pdf

[23] https://youtu.be/LEOIxAHqC1I?t=170

[24]National Academies of Sciences, Engineering, and Medicine. 2000. The Impact of Selling the Federal Helium Reserve. Washington, DC: The National Academies Press. https://doi.org/10.17226/9860

[25] Hwang, S.-C., and W.R. Weltmer Jr. 1995. "Helium Group (Gases)." *Encyclopedia of Chemical Technology*, 4th ed., vol. 13, M. Howe-Grant, ed. New York, N.Y.: John Wiley & Sons, 1-39.

[26] https://www.desertmountainenergy.com/desert-mountain-energy-announces-helium-discovery-on-well/

[27] https://www.govinfo.gov/content/pkg/CHRG-111hhrg57170/html/CHRG-111hhrg57170.htm

[28] https://youtu.be/Oll20isBdeY

[29] https://youtu.be/Zj25U6EP4sE

[30] https://youtu.be/Zj25U6EP4sE?t=2466

[31] https://youtu.be/Oll20isBdeY

[32] https://youtu.be/nrQq6eXtImA?t=2117

[33] https://youtu.be/ab7zx8ql82k?t=485

[34] https://www.mdpi.com/1996-1073/13/22/6134/htm

[35] https://www.desertmountainenergy.com/desert-mountain-energy-discovers-commercial-helium-hydrogen-well/

[36] https://www.desertmountainenergy.com/desert-mountain-energy-discovers-hydrogen-field-in-arizona/

[37]https://www.desertmountainenergy.com/desert-mountain-energy-selects-processing-plant-builder/

[38] https://www.desertmountainenergy.com/desert-mountain-energy-corporate-update/