D3 Energy Limited (ASX: D3E)

World-scale helium resources

Overview

D3 Energy has over 440,000 acres of exploration and appraisal interests in South Africa with discovered natural gas and helium. High helium levels (4-9%) and large, independently assessed, discovered resources (474 bcf methane and 22 bcf helium), with exploration upside in four permits, point to a world-scale helium asset. The projects are adjacent to Renergen's (ASX:RLT) new helium and LNG plant, demonstrating economic potential. We value D3E at $0.65/share based on DCF modelling of risked resources, with upside to $0.94/share on project derisking. D3E is trading at a significant discount to ASX, AIM and TSXV peers on an EV/resource basis (D3E $0.37/kscf vs $5.05/kscf helium peer group average).

Key points

kscf = thousand standard cubic feet

Background: D3E listed on 13th May 2024 with 100% interests in four permit areas in the Free State, ~250 km SW of Johannesburg. Average gas concentrations have been measured at 4.1% helium and 80-90% methane. The methane is of biogenic origin, resulting in minimal decline in flow rate from mineral wells drilled over 40 years ago. D3E believes the permits are also prospective for coal seam gas and conventional natural gas. D3E is focused on appraising the discoveries and adding to the resource base.

Investment thesis: South Africa is energy-short, with demand for natural gas expected to increase markedly in the near term as pipeline imports from Mozambique decline. At the same time, global demand for helium is rising, evidenced by rapidly increasing helium prices (18%pa CAGR over the past five years) and constrained supply. D3E is well placed to fill this gap.

Value proposition: US dominance in helium production has declined over the past two decades, with the global community increasingly dependent on Qatar and Russia. Supply diversification considerations and forecast helium demand growth deliver strong internal rates of return, with access to strategic funding for project development likely. Project value increases markedly with lower cost of capital, attractive to large acquirers.

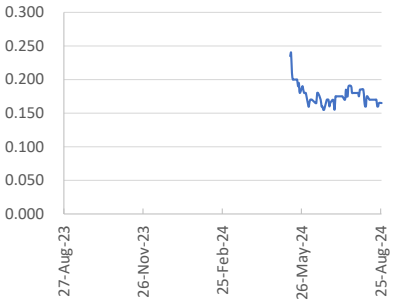
Technology: Helium extraction from natural gas is well understood and has been practiced for 100 years, with separation via cryogenic cooling. Helium is designated a critical commodity by the EU and US, used in semi-conductor manufacturing, MRI machines, aerospace, cryogenics, scientific research, welding, leak detection, diving, quantum computing and lifting.

Risks: Appraisal and exploration outcomes; well performance; permit grant/renewals; land access; community support; ongoing funding; market offtake (domgas/ helium exports); commodity prices; entry of new helium producers; country risk (South Africa); exchange controls.

Price catalysts: Appraisal drilling results; production testing outcomes (well production and decline rates); project feasibility studies; product offtake agreements / project partners.

Next steps: Drilling of RBD12 and production testing of RBD12, RBD03 and RBD01 (Q3 CY24); longer term production testing (Q4 CY24); seismic acquisition and interpretation (Q3 CY24/Q1 CY25); drilling Nooitgedacht well (Q4 CY24); five well drilling program and testing (1H CY25).

SHARE PRICE PERFORMANCE



Closing price as of 23rd August 2024
(listed 13th May 2024)

CAPITALIZATION	
Last price	$0.165
52-week range*	$0.150-0.255
Capitalization	$19.9m
Cash: 30th Jun	$8.6m
Debt: 30h Jun	$0.0m
EV	$11.3m
Shares	120.8m
Options/rights	21.5m
Conv Notes	0.0m
Balance date	30th June
* listed 13th May 2024	
RESERVES AND PRODUCTION (EST.)	
1P (30 Jun 24)	-
2P	-
3P	-
2C methane	474.6 bcf
2C helium	22.4 bcf
FY24a	-
FY25e	-
SHAREHOLDERS (%)	
Board/mgt	17.5%
Corp/insto/strat.	11.4%
Retail	71.1%
LEADERSHIP	
Chair	Greg Columbus
MD/CEO	David Casey
ED	Matthew Worner
Tech. Mgr.	John Zetzman
Eng. Mgr.	Gerard Ryan

Disclosure: This is a commissioned research report and K1 Capital will receive a fee for preparing this report.

Author: John Young
jayoung@K1capital.net.au

Table 1 Financial summary

	Units	FY25e	FY26e	FY27e	FY28e	FY29e	FY30e
CPI, forex & prices							
US inflation rate	% pa	2.20	2.20	2.20	2.20	2.20	2.20
Australian inflation rate	% pa	2.50	2.50	2.50	2.50	2.50	2.50
Inflation Factor - US : Dec-23	-	1.028	1.050	1.073	1.097	1.121	1.146
$US/$A forex (base)	$US/$A	0.65	0.65	0.65	0.65	0.65	0.65
Brent	$US/bbl	85	83	82	82	85	86
Nat Gas (Henry Hub)	$US/mmBtu	3.0	3.3	3.4	3.5	3.5	3.6
Nat Gas (Sth Africa) - wholes	$US/mmBtu	8.9	8.9	8.9	9.1	9.3	9.5
Received prices							
Oil	$US/bbl	-	-	-	-	-	-
Condensate	$US/bbl	-	-	-	-	-	-
Gas	$US/mmBtu	-	-	9.2	9.0	9.2	9.4
LPG	$US/bbl	-	-	-	-	-	-
LNG/CNG	$US/t	-	-	-	-	-	-
Electricity	$US/MWh	-	-	-	-	-	-
Helium	$US/kscf	-	-	-	-	428	395
CO2e	$US/t	-	-	-	-	-	-
Total	$US/boe	**-**	**-**	**52.6**	**57.2**	**161.7**	**165.2**
Net production by project							
Phase 1 pilot (5 wells)	mmboe	-	-	0.02	0.03	0.03	0.01
Phase 2 (30 wells)	mmboe	-	-	-	-	0.09	0.05
Full field (2C)	mmboe	-	-	-	-	-	-
-	mmboe	-	-	-	-	-	-
-	mmboe	-	-	-	-	-	-
-	mmboe	-	-	-	-	-	-
-	mmboe	-	-	-	-	-	-
-	mmboe	-	-	-	-	-	-
-	mmboe	-	-	-	-	-	-
-	mmboe	-	-	-	-	-	-
Total	mmboe	**-**	**-**	**0.02**	**0.03**	**0.12**	**0.07**
Net production by product							
Oil	mmbbl	-	-	-	-	-	-
Condensate	mmbbl	-	-	-	-	-	-
Gas	PJ	-	-	0.12	0.20	0.75	0.41
LPG	mmbbl	-	-	-	-	-	-
LNG/CNG	Mt	-	-	-	-	-	-
Electricity	TWh	-	-	-	-	-	-
Helium	bcf	-	-	-	-	0.03	0.02
Total	mmboe	**-**	**-**	**0.02**	**0.03**	**0.12**	**0.07**
Total production	kboed	**0.00**	**0.00**	**0.05**	**0.08**	**0.33**	**0.19**
Production growth	%		-	-	49.6	301.1	-41.7
Revenue							
Oil	M$A	-	-	-	-	-	-
Condensate	M$A	-	-	-	-	-	-
Gas	M$A	-	-	2	3	10	6
LPG	M$A	-	-	-	-	-	-
LNG/CNG	M$A	-	-	-	-	-	-
Electricity	M$A	-	-	-	-	-	-
Helium	M$A	-	-	-	-	20	12
CO2e	M$A	-	-	-	-	-	-
Total modelled	M$A	**-**	**-**	**2**	**3**	**30**	**18**
Total reported	M$A	-	-	-	-	-	-
Revenue growth	%		-	-	63.1	1,031.4	-40.4
Operational metrics							
Revenue	$A/boe	-	-	74.5	79.0	221.5	222.0
Production & transport costs	$A/boe	-	-	-15.2	-16.0	-33.9	-27.0
Royalties & prod purchases	$A/boe	-	-	-3.8	-4.0	-11.1	-11.1
Admin	$A/boe	-	-	-191.4	-128.1	-32.1	-55.2
EBITDA margin	$A/boe	-	-	-135.9	-69.1	144.5	128.7
D&A	$A/boe	-	-	-16.3	-17.1	-44.9	-33.4
Tax and financing	$A/boe	-	-	48.8	-112.4	12.6	-330.6
Normalized NPAT	$A/boe	-	-	-103.3	-198.6	112.1	-235.4
Resource/production	years	-	-	46.6	30.4	7.4	12.5
Product mix	% liquids	-	-	-	-	-	-
Change vs. prior report							
USD/AUD (average)	$US/$A	-	-	-	-	-	-
Brent USD	$US/bbl	-	-	-	-	-	-
Brent AUD	$A/bbl	-	-	-	-	-	-
Production	mmboe	-	-	-	-	-	-
Revenue	$m	-	-	-	-	-	-
Cash opex (-ve = inc.)	$m	-	-	-	-	-	-
EBITDA	$m	-	-	-	-	-	-
Normalized NPAT	$m	-	-	-	-	-	-
Cash (YE)	$m	-	-	-	-	-	-
Debt (YE, +ve = inc.)	$m	-	-	-	-	-	-
Capex (+ve = inc.)	$m	-	-	-	-	-	-

	Units	FY25e	FY26e	FY27e	FY28e	FY29e	FY30e
P&L	M$A						
Sales revenue		-	-	2	3	30	18
Other revenue		-	-	-	-	-	-
Production costs		-	-	-0	-1	-5	-2
Royalties & prod purchases		-	-	-0	-0	-1	-1
Admin		-2	-3	-4	-4	-4	-4
Other		-	-	-	-	-	-
EBITDA		**-2**	**-3**	**-3**	**-2**	**19**	**10**
Deprec & Amort		-	-	-0	-1	-6	-3
EBIT		**-2**	**-3**	**-3**	**-3**	**13**	**8**
Net Interest Expense		0	0	0	-6	-15	-34
EBT		**-2**	**-3**	**-3**	**-9**	**-2**	**-27**
Tax expense		0	1	1	3	17	8
Minorities / prefered dividends		-	-	-	-	-	-
Normalized NPAT		**-1**	**-2**	**-2**	**-7**	**15**	**-19**
Abnormals		-	-	-	-	361	-
Reported NPAT		**-1**	**-2**	**-2**	**-7**	**376**	**-19**
Effective tax rate	%	*23.2*	*30.0*	*30.8*	*28.3*	*883.2*	*29.2*
Cash flow	M$A						
EBITDA		-2	-3	-3	-2	19	10
Change in work cap		-	-	-	-	-	-
Deferred tax		-	-	-	-	-	-
Other operating items (tax, etc)		-0	0	0	-4	-107	-56
Operating cash flow		**-2**	**-3**	**-3**	**-6**	**-88**	**-45**
PPE capex		-	-11	-	-203	-	-528
Exploration capex		-2	-	-	-	-	-
Development capex		-	-	-	-7	-7	-20
Other investing items		-	-	-	-	661	-
Investing cash flow		**-2**	**-11**	**-**	**-209**	**654**	**-548**
Inc/(Dec) in Equity		6	11	2	64	-	-
Inc/(Dec) in Borrowings		-	-	-	151	-	403
Dividends paid		-	-	-	-	-	-
Other financing items		-0	0	-0	-0	-	-
Financing Cash Flow		**6**	**11**	**2**	**215**	**-**	**403**
Net Inc/(Dec) in Cash		**1**	**-2**	**-1**	**-0**	**567**	**-190**
Free cash flow		**-4**	**-14**	**-3**	**-216**	**567**	**-593**
Balance sheet	M$A						
Cash & cash equivalents		9	7	6	6	573	382
Other current assets (DTA)		4	5	6	10	1	13
PPE, Exp & Dev		9	21	20	247	102	690
Intangible assets		-	-	-	-	-	-
Other non-current assets		**-**	**-**	**-**	**-**	**-**	**-**
Total Assets		22	32	32	262	676	1,085
Short term debt		-	-	-	-	-	15
Other current liabilities (DTL)		2	2	2	2	32	2
Long term debt		-	-	-	151	151	539
Other non-current liabilities		**3**	**4**	**4**	**25**	**32**	**87**
Total Liabilities		5	6	6	178	216	644
Minorities		-	-	-	-	-	-
Total shareholders equity (exc mi		**17**	**27**	**26**	**84**	**460**	**441**
Total Funds Employed		17	27	26	84	460	441
Net debt		-9	-7	-6	146	-421	172
Business metrics							
EBITDA margin	%	-	-	-	-	65.2	58.0
EBIT margin	%	-	-	-	-	44.9	42.9
Normalized NPAT r	%	-	-	-	-	50.6	-
Revenue growth	%	-	-	-	62.5	1,046.2	-40.3
EBITDA growth	%	-	-	-	-	-	-46.9
EBIT growth	%	-	-	-	-	-	-42.9
Normalized ROA	%	-6.7	-6.5	-6.9	-2.5	2.2	-1.7
Normalized ROE	%	-8.6	-7.9	-8.4	-7.8	3.3	-4.3
Ordinary shares	(million)	163	212	227	379	379	379
Wtd diluted shares	(million)	379	379	379	379	379	379
Leverage							
Net Debt / Book Ec	%	-51	-26	-22	174	-92	39
Net Debt / (ND+Bo	%	-105	-34	-28	64	-1,081	28
Net Debt / Total As	%	-40	-21	-18	56	-62	16
EBIT Interest cover	x	-	-	-	-0.5	0.9	0.2
Debt / Free Cash Fl	x	-	-	-	-0.7	0.3	-0.9
Valuation metrics							
Norm. EPS	c/sh	-0.4	-0.6	-0.6	-1.7	4.0	-5.0
EPS growth	%		41	5	195	-331	-225
PER	x	-41.8	-29.6	-28.2	-9.6	4.1	-3.3
Op Cash flow	c/sh	-0.6	-0.8	-0.8	-1.6	-23.1	-11.9
Price/Op Cash	x	-29.8	-21.3	-21.7	-10.2	-0.7	-1.4
EV/EBITDA	x	-					

Source: company data and K1 Capital forecasts

$A currency unless otherwise noted. Nominal $ basis. Year ending June.

1. Valuation

We have valued D3E using discounted cash flow (DCF) analysis for development of 2C Contingent Resources risked for technical and commercial uncertainty, and have valued Prospective Resources[1] reflecting exploration and commercial risks and time value for exploration, appraisal and subsequent development. We assume D3E's sells 60% of the project in mid-2029 prior to full field development. We estimate a base case valuation of $0.56/share, with upside to $0.80/share on full derisking of 2C resources. Upside doubles with ~30% increases in commodity prices (reports suggest international delivered helium prices may already be at or above these elevated levels, as noted later in Section 4).

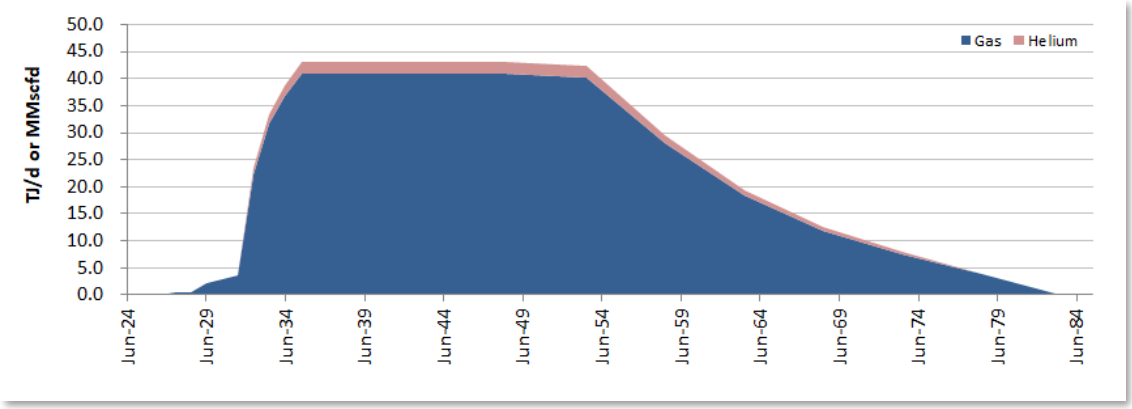
Table 2 Valuation cases

Case	Description	$m	$/sh
Base	2C resources (475 bcf methane / 22 bcf helium), risked at 60%) staged development of the Motuoane gas project in ER315 at $US8.35/GJ field gate gas price, $US390/kscf helium price. (1,2) 40 TJ/d CNG/LNG, 2.2 MMscfd helium gross sales. 12% discount rate plus 1.5% country risk. 2U Prospective resources valued at time-adjusted DCF multiple (production from 2035 at 10% geological chance of discovery and commercial risk).	**245**	**0.65**
Bear	1C resources (291 bcf methane / 14 bcf He) (risked @ 60%), 2U prospective resources (risked at 10%). 25 TJ/d CNG/LNG, 1.3 MMscfd helium gross sales	175	0.46
Bull	2C Contingent Resources (risked @ 100%) + 2U Prospective Resources (risked @ 10%)	356	0.94
Blue Sky	Bull case, $US12/GJ gas price, $US500/kscf helium price.	741	1.95
Memo:	Current share price (23rd August 2024 closing price)		0.165

Source: K1 Capital analysis.

1. 5-well pilot commencing in late 2025 (Phase 1) producing CNG, followed by a 30 well LNG and liquid helium project in 2029 (Phase 2) prior to full field development of ~270 wells in 2032 (Phase 3), produced over 40 years.
2. Real Dec 2023 long run prices (based on $US75/bbl Brent long run price).
3. We assume the sale price achieved for partial sale of the LNG/helium project in 2029 is equal to the risk adjusted NPV of the project. This provides cash for D3E's share of full field development (Phase 3) capex.
4. We assume Phases 2 and 3 are 70% debt funded.
5. We estimate a fully diluted share count of 379m shares (c.f. current 120.8m shares), reflecting additional equity required to appraise and develop the project before operations can be part sold and internally funded.

Figure 1 Gross production (base case)



Source: K1 Capital analysis. Assumes 20-year plateau rate. Natural gas TJ/d, helium MMscfd

[1] Prospective Resources are undiscovered and hence are subject to exploration risk (geological chance of success) as well as development risk (commercial risk).

Figure 2 Valuation summary

© Copyright 2016-24 K1 Capital Pty Ltd NPV @ 12.0% WACC+country factor Valuation as of 26 Aug 2024	Net volume PJe	Resource NPV $A/GJ	Risk factor %	Other value M$A	Risked value M$A	Risked value $A/sh	Unrisked value $A/sh	Project WACC %
Projects (DCF model valuation)	**179.0**			**116**	**191**	**0.50**	0.91	
Phase 1 pilot (5 wells)	2.6	0.13	80	1	1	0.00	0.01	13.5
Phase 2 (30 wells)	13.2	1.12	70	17	27	0.07	0.17	13.5
Full field (2C)	163.1	0.67	60	98	163	0.43	0.73	13.5
-	-	-	-	-	-	-	-	13.5
Exploration / Appraisal	**247.7**				**17**	**0.04**	0.45	
Prospective 2U	247.7	0.68	10		17	0.04	0.45	
-	-	-	-		-	-	-	
-	-	-	-		-	-	-	
Other (corporate, cash, debt, etc)					**37**	**0.10**	0.10	
Corporate costs					-29	-0.08	-0.08	
Hedging & Investments					-	-	-	
Franking credits (@ 0 %)					-	-	-	
Cash					7	0.02	0.02	
Additional Equity					59	0.15	0.15	
Debt					-	-	-	
								Previous
Equity Valuation @ base case	-				**245**	**0.650**	1.45	-
Mkt Cap @ current share price	(and undiluted share count)				**20**	**0.165**		
Number of shares (undiluted)	000,000				120.8	@ valuation date		
Number of shares (diluted)	000,000				379.2	fully funded devel't		
"Other value" is consideration for equity selldown based on project risked NPV.								

Source: K1 Capital analysis. Assumes 40% retained interest after selldown. Net volumes shown are for methane resources (at 86.7 vol% of raw gas), prior to losses for in-field use and CNG compression or LNG liquefaction. Project economics include development of helium resources (4.1 vol% of raw gas).

The base case resource multiple we have used to value D3E's prospective resources ($0.68*10% risk = $0.068/risked GJ natural gas) is equivalent to $1.55/kscf helium.[2] This multiple is conservative relative to the current market for ASX and TSXV juniors, which we estimate to be $5.05/kscf helium for risked resources[3] (as shown in Table 6).

The company valuation is very sensitive to the discount rate used due to the high capital cost for LNG and helium liquefaction and long project life. This illustrates the attractiveness of the project to potential large acquirers with a lower cost of capital.

Table 3 Discount rate sensitivity

Discount rate (%)	10.0%	12.0%	13.5%	15.0%
Valuation ($/share)	$2.13	$1.14	$0.65	$0.29

Source: K1 Capital analysis. Discount rate includes country risk premium.

[2] $0.068/GJ * 1.08 GJ/kscf * 86.7% CH4/4.1% He = $1.55/kscf He

[3] Reserves at 100% risk factor, Contingent Resources at 80% risk factor, Prospective Resources at 10% risk factor.

2. Overview of projects

2.1 Permits

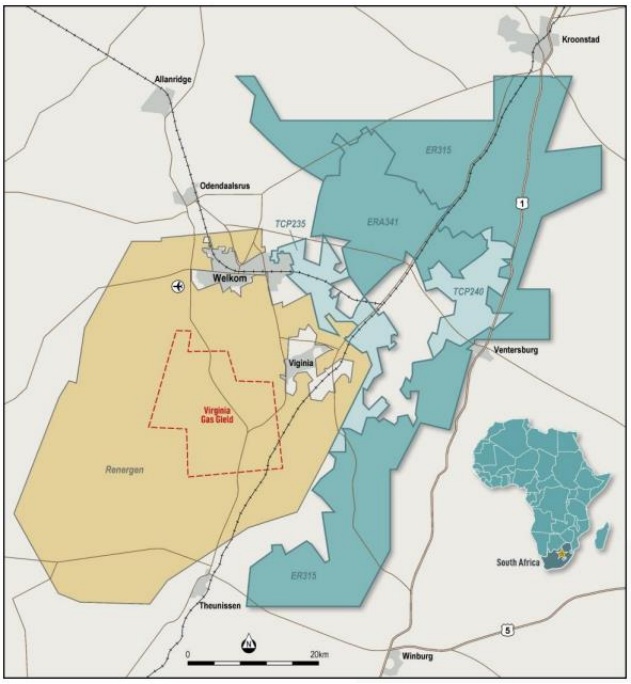
D3E has a 100% interest in four permit areas totalling 442,750 acres (1,791 km^2) in the Free State of South Africa:

1. ER315 294,986 acres (1,193 km^2)
2. ERA341 81,535 acres (330 km^2)
3. TCP235 36,843 acres (149 km^2), and
4. TCP240 29,386 acres (119 km^2) [4]

The areas are prospective for natural gas and helium, which has been confirmed from gas free-flowing from historical gold exploration boreholes. Average gas concentrations have been measured at ~4% helium (with readings up to 9%) and 80-90% methane. The methane appears to be biogenic in origin and is believed to have experienced little reduction in flow rate since the boreholes were drilled in the mid-1980s. In addition to biogenic methane and helium D3E believes the permits are prospective for coal seam gas and natural gas from conventional sandstone reservoirs. The areas are adjacent to ASX listed Renergen (ASX: RLT), which has an operational cryogenic helium and LNG plant ~20km to west.

Given the presence of gas flowing to surface D3E's activities in the areas around the boreholes constitutes appraisal of discovered gas rather than exploration.

Figure 3 D3E permit areas



Source: D3 Energy Limited, Investor Update, "Energy & Helium for the 21st Century", May 2024, p 6.

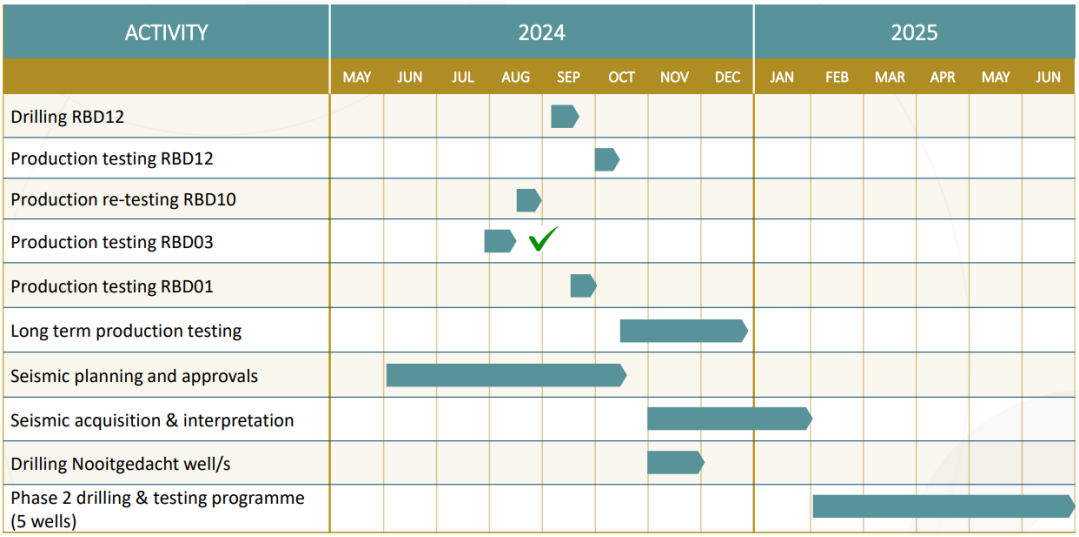
[4] ER denotes Exploration Right, ERA = Exploration Right Application, TCP = Technical Cooperation Permit. A TCP allows the holder to carry out desktop studies, acquire existing seismic and other data but does not include any exploration activities. The TCP is valid for a period of 1 year and is not renewable or transferable. An ER is valid for a period of 3 years, renewable for three two-year terms.

2.1.1 ER315

ER315 has independently certified mid-case Contingent and Prospective Resources of 474 bcf methane and 22 bcf Helium (2C), and 573 bcf methane and 27 bcf Helium (2U), as of 12 Feb 2024.[5]

D3E drilled and tested two wells, RBD10 and RBD11, in early 2024. Results included 5.0% and 5.1% helium respectively, with methane of 85% at depths of ~420-550 m. RBD10 flowed gas at a stabilized flow rate of 126 kscfd for a 36-hour period with no decline; its rate is expected to increase on retesting with newly acquired equipment. RBD11, which was drilled on the opposite side of a geological fault, flowed at rates too low to measure.[6] The next series of wells will target the hanging wall side of the fault, which flowed in RBD10. D3E estimates drilling costs of $250k/well.

Figure 4 D3E work program



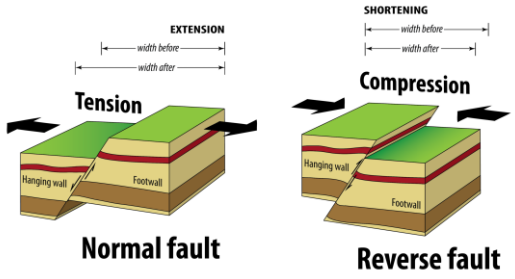
Source: D3 Energy Limited, Investor Update, "Energy & Helium for the 21st Century", 21st August 2024, p 24.

2.2 Gas prospectivity

The primary source of the methane gas is microbial in origin from deep within the Witwatersrand Supergroup, with groundwater circulating through large faults and contacting bacteria living deep within the earth's crust. Little methane is attributed to the Karoo coal beds or the carbonaceous shales. There is anecdotal evidence of blowers within the D3 license area producing methane gas for over forty years without any discernable pressure drop, however, there are no quantified studies.

[5] The resource assessment was undertaken by Sproule, who undertook the assessment for Renergen's Virginia Gas Project.

[6] The hanging wall (or headwall) of a fault is the rock above the fault; the footwall is the rock below. These terms were originally used by miners to describe the rocks above and below an ore body. In a "normal" fault (one formed under tension) the hanging wall is moved below the footwall. In a "reverse" fault (one formed under compression), the hanging wall is moved above the footwall. Source: https://pressbooks.bccampus.ca/geoclone/chapter/13-3-fractures-faults-and-joints-2/

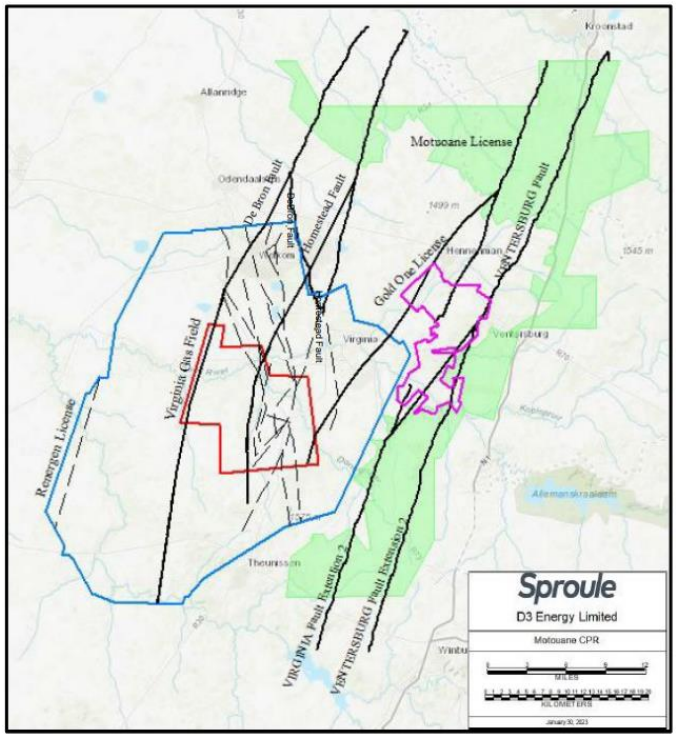


The area is geologically complex, with multiple faults with large offsets and fracturing contributing to significant variation in permeability. The gas migration and charge are dependent on fracture porosity. Most of the gas is found in fractures and adjacent to volcanic dykes and sills within the Ventersdorp and Witswatersrand Groups. There does not appear to be any significant matrix porosity.

D3E's permit area includes eight gas emitting bore holes ("blowers") and six inactive holes. The blowers were drilled by mining companies exploring for gold in Witwatersrand Formation which underlies the coal-bearing Karoo and Ventersdorp lavas. The project also has over 100 shallow wells drilled into the Karoo section, however, these were not considered by the resource assessor for the Contingent Resources because they did not penetrate the Witswatersrand Formation and the basement faulting which connects the source of the gas to the traps above.

Nearly two thousand wellbores have been drilled across the district for water or mining assessment. Previous studies noted that every gas-yielding borehole occurred close to faults and dikes. Most of the boreholes were drilled to the west of D3E's Motuoane License. However, the Virginia fault, which is present in D3E's licence, yielded large volumes of methane in the adjacent Gold One area. There is currently little geological information regarding the Ventersburg fault as a gas target. No major gas intersections were recorded along the de Bron fault. Importantly, Renergen has achieved high exploration success rates (~90%), partly through using satellite imagery to map vegetation stress and relate this to methane seepage from faults.[7]

Figure 5 Map showing proximity of D3E licence to Renergen's Virginia project



Source: "Estimation of Methane and Helium Contingent and Prospective Resources in the Motuoane Gas Project, Free State Province, Republic of South Africa, as of December 1, 2022", Sproule, February 2024, p 15.

2.3 Resource estimates

The Contingent Resources and Prospective Resources for methane and helium, prepared by Sproule as of December 2022, are shown below. The resources are based on gas in fractures and adjacent to

[7] Renergen 2021 reserves report, p 21.

volcanic dykes and sills within the Karoo and Ventersdorp Groups. They do not include the potential for coal seam gas, given lack of information on coal desorption, adsorption and thermal maturity.

The contingencies requiring resolution prior to conversion to reserves include D3E: (1) demonstrating the ability to drill, complete and operate successful wells; (2) taking and analyzing multiple gas samples for composition and heating value; (3) validating reservoir pressures and well deliverability; and (4) developing a field development plan and committed drilling schedule.

Figure 6 D3E Contingent and Prospective Resources (as of 1 Dec 2022)

Reserve/Resource category	Units	Low	Medium	High
Raw gas	bcf	**565.1**	**1,208.8**	**2,733.4**
Reserves	bcf			
Contingent resources	bcf	336.7	547.5	858.0
Prospective resources	bcf	228.4	661.3	1,875.4
Methane		**489.9**	**1,048.0**	**2,369.8**
Reserves	bcf			
Contingent resources	bcf	291.9	474.6	743.9
Prospective resources	bcf	198.1	573.4	1,625.9
Helium		**23.2**	**49.6**	**112.1**
Reserves	bcf			
Contingent resources	bcf	13.8	22.4	35.2
Prospective resources	bcf	9.4	27.1	76.9
Composition				
Methane	%	*86.7%*	*86.7%*	*86.7%*
Helium	%	*4.1%*	*4.1%*	*4.1%*
Other (N2, CO2)	%	*9.2%*	*9.2%*	*9.2%*

Source: K1 Capital analysis of data from "Estimation of Methane and Helium Contingent and Prospective Resources in the Motuoane Gas Project, Free State Province, Republic of South Africa, as of December 1, 2022", Sproule, February 2024, p 22. https://d3energy.com.au/wp-content/uploads/2023/05/111137.D3EnergyLimited.FinalReport.pdf

2.4 Gas commercialization options

D3E is working towards initial natural gas offtake agreements with NOVO Energy, a South African integrated energy company and gas trader, and major D3 Energy shareholder (11.39%). NOVO owns or is seeking to develop gas infrastructure (CNG/LNG/pipelines) and provide turnkey solutions for industrial, transport, power generation and feedstock customers. Helium offtake arrangements are at a very early stage, with international export of liquefied helium the most likely route.

We expect a staged development, with the initial phase comprising a pilot to establish well performance parameters and variability across parts of the permit area, probably selling into small-scale third-party CNG facilities. We assume this will be followed by a larger development involving micro-LNG for diesel fuel replacement and liquified helium for export, prior to full field development.

10 TJ/d should support ~45-55 MW power generation or ~60 kt/yr (~200 t/stream day) LNG.[8][9] 100 TJ/d should support ~670 MW of combined cycle power generation.[10] Significant existing coal fired generation is expected to retire after 2030 [11], creating new opportunities for gas demand.

[8] Gas engine power generation = 10 TJ/d / (24 h/d*3600 sec/h) * 40-50% efficiency * 10^6 = 46-58 MW.

[9] Micro LNG = 10 TJ/d * 365 day/yr / ~60 PJ/t LNG = = 61 kt/yr = ~167 kt/cd => ~200 kt/sd at 80% utilization

[10] Combined cycle power generation = 100 TJ/d / (24*3600 s/d) * 58% efficiency * 10^6 = 671 MW

[11] Republic of South Africa Department of Energy, "Integrated Resource Plan (IRP 2019)," Oct 2019. http://www.energy.gov.za/files/docs/IRP%202019.pdf p52.

3. South African natural gas market

South Africa is a significant coal consumer and exporter but produces little conventional oil or gas. The country has a highly developed synthetic fuels industry and the third-largest oil refinery system in Africa (545 kbd, behind Algeria 650 kbd and Egypt 800 kbd).[12]

Limited natural gas market: Natural gas makes up ~3% of the total primary energy mix, well below OECD economies such as Europe (24%) and the US (28%). The industry is at early stage of development with limited internal competition. Barriers to entry include a lack of infrastructure, high capital costs, and community concerns regarding hydraulic stimulation. Shale gas exploration was halted in 2011 by government moratorium. A 2013 PwC report commissioned by Kinetiko (ASX: KKO) identified potential new demand of ~21-37 PJ/yr, creating opportunities for new entrants.

Emerging supply shortfall: Most of South Africa's gas requirements are imported by Sasol via the ROMPCO pipeline from Mozambique to supply Sasol's Secunda and Sasolburg petrochemical plant.[13] Renergen (ASX: RLT) previously estimated a supply shortfall of 80 PJ/yr in Johannesburg and the Industrial Gas Users Association predicts a growing shortfall due to depletion of Mozambique's field.

Power industry problems: South Africa has a large power industry, accounting for more than 80% of the electricity generated in southern Africa (via the Southern African Power Pool). Demand has outstripped supply since 2007/8 and South Africa has progressively reduced its export generation commitments, exacerbating the shortage in neighbouring countries. Despite a 75% electrification rate nationwide only 55% of the rural population has access to electricity (c.f. 88% in urban areas). According to 2009 IEA data, ~12.5 million people had no access to electricity. Approximately 90% of South Africa's electricity is generated in coal-fired power stations, with ~5% via nuclear and 5% by hydroelectric and pumped storage schemes. There are few, if any, new economic hydro sites that could be developed to deliver significant amounts of power.

Opportunities for independent generation: Generation is dominated by Eskom, the state-owned utility, which also owns and operates the national electricity grid. The government approved private-sector participation in the electricity industry in 2003, with future power generation capacity to be divided between Eskom (70%, currently 95%) and independent power producers (IPPs) (30%). South Africa is targeting additions of over ~40 GW from 2020 to 2030, primarily from coal. Power prices have risen approximately three-fold over the 10-year period from 2008 to 2017.[14]

Domgas pricing: Gas price limits and open-access pipeline tariffs are set by the National Energy Regulator of South Africa (NERSA). Own-use pipelines are not subject to piped gas regulations, with prices set by negotiation. The maximum gas prices are linked to coal, diesel, electricity and other indicators, with allowances for trading margins and transmission costs, or via a cost pass-through method for LNG imports.[15] Maximum prices are set for six customer classes, based on annual gas consumption and are adjusted quarterly. Actual prices may be below the maximum levels and are determined through bilateral negotiations.

We estimate a mid-case wholesale gas price for producers of $US8.35/MMBtu (@ $US75/bbl Brent as a proxy for energy input prices).

[12] McKinsey, "Energy Insights: African refineries".

[13] ROMPCO: Republic of Mozambique Pipeline Investments Company (Pty) Ltd. 25% South African Government, 25% Mozambican Government, 50% Sasol Limited. 26" diameter (plus looping), ~865 km, Temane to Secunda, 200 PJ/yr.

[14] Republic of South Africa Energy Department, "2018 South African Energy Prices Statistics" Available: http://www.energy.gov.za/files/media/explained/2018-South-African-Energy-Prices-Statistics.pdf.

[15] Methodology to Approve Maximum Prices of Piped-Gas in South Africa promulgated by NERSA in October 2011. NERSA, "SL CNG (Pty) Ltd Maximum Price Application for the Period July 2017 to June 2018,"

4. Helium overview

4.1.1 Helium uses

Helium (atomic symbol He) is a colourless, odourless, non-toxic and inert gas at room temperature. Its primary uses are as a cryogenic liquid in the cooling of superconducting magnets (with its main commercial application in MRI scanners), as a pressurizing and purge gas, as a protective atmosphere for arc welding, in processes such as growing crystals to make silicon wafers, and as a lifting gas in balloons and airships.

Helium has the lowest liquefaction temperature of all materials, at -269 °C (~4.2 K or −452 °F). Nothing can substitute for helium in cryogenic applications if temperatures below -220 °C (-429 °F) are required. Argon can be substituted for helium in welding, and hydrogen can be substituted in some lifting applications in which hydrogen's flammability can be managed. Hydrogen is also being investigated as a substitute for helium in deep-sea diving applications below 300 meters (~1,000 feet).

4.1.2 Helium products

Helium is marketed in various grades, based on purity. The typical naming convention is denoted by the first number in the grade (before the decimal point) equal to the number of 9's in the purity and the second number (after the decimal point) representing the number after the last 9 (e.g. 4.7 grade = 99.997%). Other naming conventions designate purity by an alpha letter. Grade 5 is the most common grade and is often used even when this purity is not required due to distribution logistics.

Most helium is sold in liquid form, either in small, insulated containers ("dewars") which hold ~100 litres (125 kg), or in large ISO containers of ~42 m^3 (~5,250 kg). Small quantities are supplied in gaseous form in high-pressure cylinders (16-30 MPa) holding ~8 std m^3 (1.3 kg or ~282 scf), while larger quantities are supplied in tube trailers of up to 4,860 std m^3 (820 kg or ~172 kscf). Transport is challenging due to temperature and pressure requirements, with net evaporation of 1.0-1.2%/day. Modern 40' helium ISO containers can hold at 90% capacity for 45 days using liquid nitrogen cooling before loss of product occurs.[16]

4.1.3 Helium pricing

Wholesale helium pricing is relatively opaque, with no central market price. Sales are often based on bilaterial contracts for periods of varying duration (2-5 years). The main public source of wholesale pricing data is the annual Mineral Commodity Summaries published by the US Geological Survey. The USGS values are estimates and it notes sales are often conducted at a premium to the price estimates. The private price of "Grade A" (≥99.995% helium) has risen over the past two decades at ~6.5 %pa in real dollar terms (8.3% in nominal dollar terms), with steep increases following the closure of the US federal helium reserves in 2021.

Recent prices for 99.995% helium are reported by the USGS as $US390/kscf. However, contract prices estimated from disclosures by NASA appear to be significantly higher. In September 2022 NASA announced a three year contract for ~122 MMscf of liquid and gaseous helium, which we estimate was equivalent to ~US810-1,220/kscf.[17,18] In November 2022 NASA announced a five year contract for

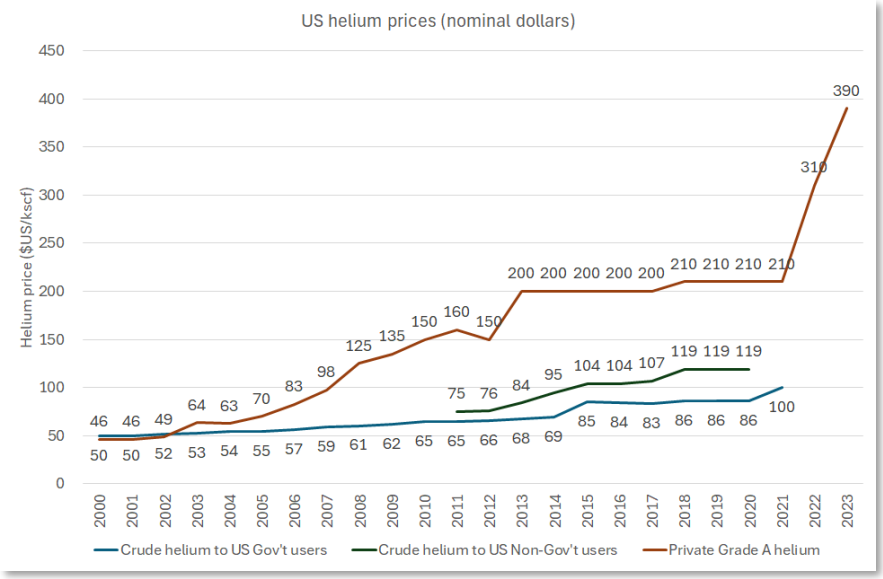
[16] Vaclav Chrz, "Helium storage and transport", Chart Industries, https://indico.cern.ch/event/90787/sessions/113901/attachments/1093425/1559937/Helium_Storage_and_Transport.pdf

[17] Liquid helium density = 125 kg/m3; gas density at standard conditions = 0.179 kg/m3 => 698 m3 gas/m3 liquid; 1 ML liquid = 24.7 kscf gas equivalent

[18] Two-year base period extendable to three years for 1.4 ML of liquid helium and 87.7 MMscf gaseous helium (total of 122 MMscf) for ~US149m, "NASA Awards Contract for Acquisition of Gaseous, Liquid Helium", 29th Sep 2022, https://www.nasa.gov/news-release/nasa-awards-contract-for-acquisition-of-gaseous-liquid-helium/

~815 bcf of liquid helium, which we estimate was equivalent to $US510-1,310/kscf.[19] These costs are significantly higher than the previous contract announced by NASA in September 2014 for ~380 MMscf over five years, which we estimate was equivalent to ~$US115 /kscf.[20] NASA contracts announced in September 2019 did not disclose helium quantities.[21]

Figure 7 US helium prices from 2000-2023 (nominal dollars)



Source: K1 Capital analysis, from US Geological Survey, Mineral Commodity Summaries, 2000 to 2024 https://apps.usgs.gov/minerals-information-archives/mcs

4.1.4 Reserves and production

Helium is formed through radioactive decay and is found trapped with natural gas or carbon dioxide in various countries. It is extracted from raw gas by low-temperature separation (fractional distillation of the higher condensing compounds) into helium gas and then often further cooled to a liquid. A minimum helium concentration of 0.3 mol% is needed for commercial separation from natural gas, however, concentrations as low as 0.04 mol% can be separated economically from gas already cooled for LNG.[22] Whilst helium is formed on a geological time scale through radioactive decay it is effectively a non-renewable resource, because once released it escapes into space. Production of synthetic helium by artificial nuclear reactions is possible but uneconomic.

Prior to the mid-1990s the US dominated global helium production and the US government operated a strategic helium reserve in Texas (the National Helium Reserves was established at the Cliffside gas field near Amarillo, Texas in 1925). The US helium reserve was expanded in the 1950s to supply liquid helium as a coolant to create rocket fuel for the space program. From the 1960s private helium plants stored crude helium (helium and nitrogen) in the reserves, with stored helium reaching ~1 billion m3 (~35 bcf) by 1995. In 1996, with the reserve as $U1.4b in debt, the US Congress decided to discontinue the reserve and passed the Helium Privatization Act, which directed the reserve to be emptied, with

[19] 23-month base contract extendable to 59 months for 33 ML of liquid helium (and leasing six pumps) for $US1.07b, "NASA Awards Contract for Liquid Helium Acquisition at Kennedy", 18th Nov 2022, https://www.nasa.gov/news-release/nasa-awards-contract-for-liquid-helium-acquisition-at-kennedy/

[20] 10.2 ML of liquid helium and 128.6 MMscf gaseous helium (total of ~380 MMscf) for $US43.6m for up to 5 years, "NASA Awards Agencywide Helium Contract", 25th Sep 2014, https://www.nasa.gov/news-release/nasa-awards-agencywide-helium-contract/

[21] "NASA Awards Two Contracts for Supply of Gaseous, Liquid Helium", 27th Sep 2019, https://www.nasa.gov/news-release/nasa-awards-two-contracts-for-supply-of-gaseous-liquid-helium/

[22] Per US National Research Council, 2010, in "Helium concentrations in United States wells", US Geological Survey

sales commencing in 2005. The Helium Stewardship Act of 2013 (HSA) mandated the privatization of the Federal Helium System (the Cliffside storage facilities, helium enrichment unit and pipeline system). The last auction of US government helium was completed in 2018. At the end of 2023 the field held 51 million m3 (1.86 bcf) of helium. Sale of the facility is expected to be completed in 2024.

The world's helium reserves and production are summarized below.

Figure 8 Helium reserves and production by country

Country	Units	Reserves end 2023	Resources	Production 2023	Reserve life years
bcf (at 14.70 psia and 60 degF)					
Algeria	bcf	64	290	0.4	180.0
Australia	bcf	-	127	0.0	-
Canada	bcf	-	71	0.1	-
China	bcf	-	39	0.0	-
Poland	bcf	1	71	0.1	8.0
Qatar	bcf	-	357	2.3	-
Russia	bcf	60	240	0.3	212.5
South Africa	bcf	14	44	-	-
United States (gas fields)	bcf	300	727	2.1	141.5
United States (storage)	bcf	2	2	0.5	3.4
Total	bcf	**440**	**1,967**	**5.9**	**74.1**

Source: K1 Capital analysis from data from USGS Mineral Commodity Summaries from 2018 to 2024, https://pubs.usgs.gov/periodicals/mcs2024/mcs2024-helium.pdf and Renergen and D3E resource reports. Excludes Iran.

4.1.5 Global helium supply

Most worldwide helium supply is a by-product of natural gas extraction and hence is price inelastic. Helium supply has remained largely constant over the past two decades, despite significant growth in global GDP. This effectively means global helium demand has been constrained and prices have risen to balance supply through demand destruction. Without material new supply prices are expected to continue to rise. Some existing production has ceased due to natural gas field decline (e.g. Bayu Undan in Australia in 2023) and global energy flow changes (e.g. reduced production from Algeria due to increased pipeline gas sales reducing LNG and associated helium production). New production from future natural gas projects may be more difficult to achieve due to global warming concerns.

Global supply is concentrated, with the La Barge field in Wyoming, USA and the North Dome field in Qatar[23] producing 20% and 35% of global supply respectively. As a result supply is susceptible to production disruptions through plant incidents[24] and global politics [25,26].

The rising prices have stimulated exploration by juniors in Africa (South Africa and Tanzania), Australia the USA and Canada. Few have yet translated exploration into development and production, with Renergen in South Africa the main exception.

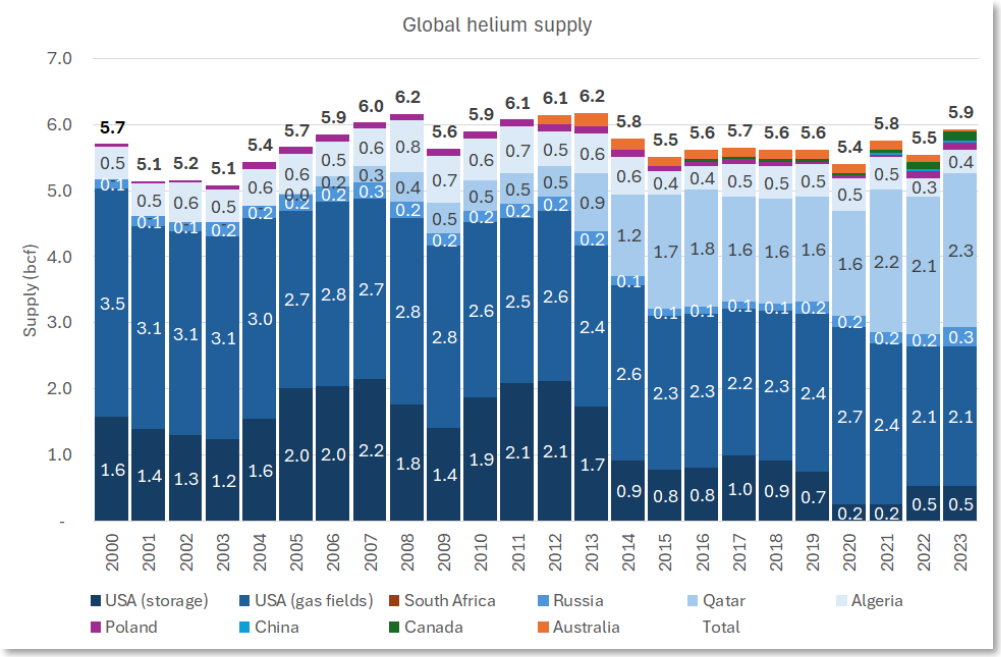
[23] The RasGas complex is the world's largest helium plant, with production of 66 million m3/y in 2023 (2.3 bcf/yr), from a capacity of 2.6 bcf/yr (https://gulfif.org/a-rising-role-qatar-and-its-competition-in-the-global-helium-market/)

[24] In 2004 the Skikda, Algeria, helium expansion project was shut down after a boiler explosion in LNG plant and increased capacity was delayed until 2008. In 2013 production was disrupted by an explosion and fire in the LNG plant, which killed 27 and injured 56 people. There were further disruptions in 2020.

[25] In June 2017 helium exports from Qatar were halted due to actions by Saudi Arabia and other Arab countries (the "Qatar diplomatic crisis") arising from Qatar's alleged support of terrorism.

[26] In 2022 helium supply from the Arzew plant in Algeria was interrupted as a result of natural gas being directed to Europe via pipeline rather than being liquified to LNG, following Russia's invasion of Ukraine.

Figure 9 Global helium supply 2000-2023



Source: K1 Capital analysis of USGS Mineral Commodity Summaries, 2000-2024

4.1.6 Strategic supply issues and price implications

Helium is classed as a critical mineral by the European Union, with the EU's Critical Raw Materials Act (CRMA) coming into force on 23rd May 2024.[27] European resources of helium are modest, at ~71 bcf in Poland. The US has the largest estimated resources (729 bcf), followed by Qatar (357 bcf) and Iran, which shares the North Dome (Qatar) / South Pars (Iran) gas-condensate field.[28] We estimate Iran's helium resources at ~144 bcf.[29]

Qatar is the largest exporter of helium, with total production capacity of 2.6 bcf/yr (of which ~2.1 bcf is utilized). Russia is increasing production and aims to meet 25 to 30% of global helium needs by the middle of this decade.[30] Iran needs foreign capital and technology to increase oil and gas capacity and build helium production facilities, which has not been possible under the current sanctions regime. Future supply from Russia (0.3->1.5 bcf/yr at 25% of global share) and from Iran in the longer term (~1.0 bcf/yr potential based on resource relativity to Qatar) could constrain upward momentum in global helium prices.

Some helium exploration companies have promoted the concept of "green helium" produced from resources without associated hydrocarbons. Typically these helium resources are found in conjunction with high carbon dioxide levels, requiring markets for carbon dioxide or carbon capture and storage to minimize the global warming potential of helium extraction.

[27] https://single-market-economy.ec.europa.eu/sectors/raw-materials/areas-specific-interest/critical-raw-materials_eu

[28] 1,260 tcf gas, 16 billion bbl condensate gross recoverable, 0.04% helium; ~71% Qatar, 29% Iran

[29] 360 tcf gas (Iran's share) * 0.04% He

[30] Gulf International Forum, "A Rising Role: Qatar and its Competition in the Global Helium Market", https://gulfif.org/a-rising-role-qatar-and-its-competition-in-the-global-helium-market/

5. Company valuation

5.1 Valuation method and key assumptions

We have valued D3E using discounted cash flow analysis for development of Contingent Resources and enterprise value to resource multiples for Prospective Resources, with values risk adjusted for technical and commercial maturity. Our resource multiples are based on analogous projects cross-checked with market metrics. Our economic model incorporates probability distributions for key variables, including reserves and resources, commodity prices, project costs and exploration success, and uses Monte-Carlo simulation to quantify the range of share price outcomes.

Table 4 General valuation assumptions

Assumption	Comment
Valuation date	26 August 2024
Discount rate	12% nominal, plus South Africa country risk premium of 1.5% (4.4% CRP per Damodaran[31] * political risk 33%, derived from data per Bekaert et al [32]). (c.f. Australia 0.0%). Risk free rate (US 10-year / 30-year bond) = 3.88 / 4.25 %, 26th Aug 2024
Inflation	2024/5/6 values per PwC Global Economy Watch, Jun 2024. Australia: 3.4/2.8/2.6/LT2.5%; US: 2.9/2.2/2.2/LT2.2%; Sth Africa: 5.0/4.6/4.6/LT4.5%
Commodity prices	Brent: $US75/bbl real long run. Sth Africa nat gas; $US8.35/MMBtu real field gate at $US75/bbl Brent Helium: $390/kscf (Grade A 99.997%) liquid
Forex	0.67 $US/$A spot. 0.65 $US/$A long term. 10-year average forward USD/AUD volatility based on historical analysis (-0.06, +0.09), per K1 Capital. ZAR:AUD = 12.05
Contingent Resources	DCF valuation. Three-stage development of 2C contingent resources. Phase 1 pilot, producing CNG Phase 2 (small scale) and Phase 3 (full field) development, producing LNG and liquified helium). 60% risk factor.
Prospective resources	Resource multiple valuation. Resource value based on DCF model, discounted for time to development. 10% geological and commercial risk factor.
Project risk factors	Adjust unrisked value for technical and commercial maturity. Typical factors are 0-20% for exploration, 20-60% for appraisal, 40-80% for development and 80-100% for production projects. Risk factors are relaxed as project milestones are achieved.
Capex and schedule risk	Industry studies note cost and schedule overruns are common. We assume Bear, Base and Bull case capex overruns of 20%, 0% and 0% respectively.
Operational performance	S&P assumes base case availability of 90% for refiners and 95% for LNG, with at least 5% reduction for downside cases. McKinsey notes availability of <75% to 97%, with an average of 85%. We assume Bear, Base and Bull case utilizations of 90%, 95% and 98% of design stream day respectively, to reflect planned and unplanned downtime.
Operational incidents	The impact of minor incidents is covered in our operating performance assumptions and discount rate. We assume no major or catastrophic operational incidents.
Other	Helium gas density (101 kPa, 15 degC) = 0.169 kg/m3, 4.791 kg/kscf.

Source: K1 Capital analysis.

[31] https://pages.stern.nyu.edu/~adamodar/New_Home_Page/datafile/ctryprem.html

[32] G. Bekaert, C. Harvey, C. Lundblad and S. Seigal, "Political Risk Spreads," Journal of International Business Studies (2014).

Table 5 Project development assumptions

Item	Comment	Ref.
Project type	Onshore biogenic natural gas and helium. Appraisal stage.	
Permit / Location	ER315, Karoo Basin, Free State, South Africa	
Lease expiry	Exploration phase expires Aug 2026 (further extension to Aug 2028 possible). Assume 30-year production licence, extendable.	
History	Gas discovered from gold exploration boreholes, 1980s.	
Ownership	100->40% on selldown and 20% Black Economic Empowerment participation	[33]
Fiscal regime	Corporate income tax 27%, royalties 5% (deductible for CIT), immediate write-off for exploration (200% of spend) and post-exploration capex (150%), indefinite carryforward of losses (no ring fencing of fields), R&D incentive.	[34] [35] [36]
Reserves/Resources (gross)	1C/2C/3C: nat gas 292/475/744 Bcf; helium: 13.8/22.4/35.2 Bcf, 12 Feb 2024 1U/2U/3U: nat gas 198/573/1,626 bcf; helium: 9.4/27.1/76.9 bcf. 86.7% nat gas, 4.1% He, 9.1% N_2, 0.1% CO_2. HHV=0.87 MMBtu/kscf	
Well performance	Based on Sproule resource assessment. Spacing: 300m, IP = 260 kscfd raw gas, decline 5%pa, abandonment 30 kscfd, well life ~40 years, EUR/well = 1.47 bcf.	
Development concept	Staged development of 2C contingent resources - Phase 1: 5-well pilot FID 2026, 7 bcf; CNG offtake, He vented - Phase 2: ~30 well, 44 bcf, 5 MMscfd raw gas, LNG and He, startup 2029. - Phase 3: ~290 well, 424 bcf, ~40 MMscfd, LNG and He, startup 2032.	
Project life	40+ years (supplies ~10% of the 2030+ global helium demand 8 bcf/yr)	
Existing Infrastructure	23 PJ/yr (63 TJ/d) 600 km, 16" Lilly gas pipeline (Secunda to Durban, via Richards Bay) ~260 km away. Potential co-firing of nearby power stations.	[37]
Capex	$US600k/well drilling/completion/gas gathering. 95% drilling success rate. Phase 1 gas processing, compression/CNG, assume funded by 3rd party. Phase 2 & 3: LNG&He liquefaction/midstream $US33m/MMscfd raw gas. (derived from 8 Mar 2023 Renergen shareholder update $1.16b less well costs)	[38]
	HE1 He: $US50m for 350 MMscf/yr (~1 MMscfd He) => $US143m/MMscfd He [39] NHE He: $US305m for 850 MMscf/yr (~2.5 MMscfd He) => $US131m/MMscfd He [40] RLT He&LNG: $US60m for 350 kg/d He & 2.7 TJ/d LNG; $US900m for 5,000 kg/d & 24 TJ/d [41]; increased to $US1.16b for 4200 kg/d He, 34.4 TJ/d LNG Mar 2023 [42]	
Opex	G&A: $2m/year, increasing to $4m/yr from 2027, escalated at Australian CPI Field: $US3k/year/well plus $2.00/kscf (from Renergen reserves report) O&M: $0.8m/yr+$0.22/kscf raw gas capacity (from Renergen reserves report)	
	HE1 He: $US15-20/kscf (2022$). NHE He: $US25m for 850 MMscf/yr => $US29/kscf	
Production/sales	Phase 1: 1.2 TJ/d CNG Phase 2&3: 3-year ramp; 67% produced at plateau over 15 & 20 yrs respect'ly. Phase 2: 5.9 TJ/d nat gas, 416 tpa He. Phase 3: 36 TJ/d nat gas, 3,833 tpa He.	
Quality / Market	CNG/LNG into domgas market, 99.999% (Grade 5) liquid helium exported	
Sales / Revenue	Sell pilot gas under "sample gas production right" (≤500 MMscf/y, for 2 years	
Specific risks	Well performance (EUR, IP, decline rate)	

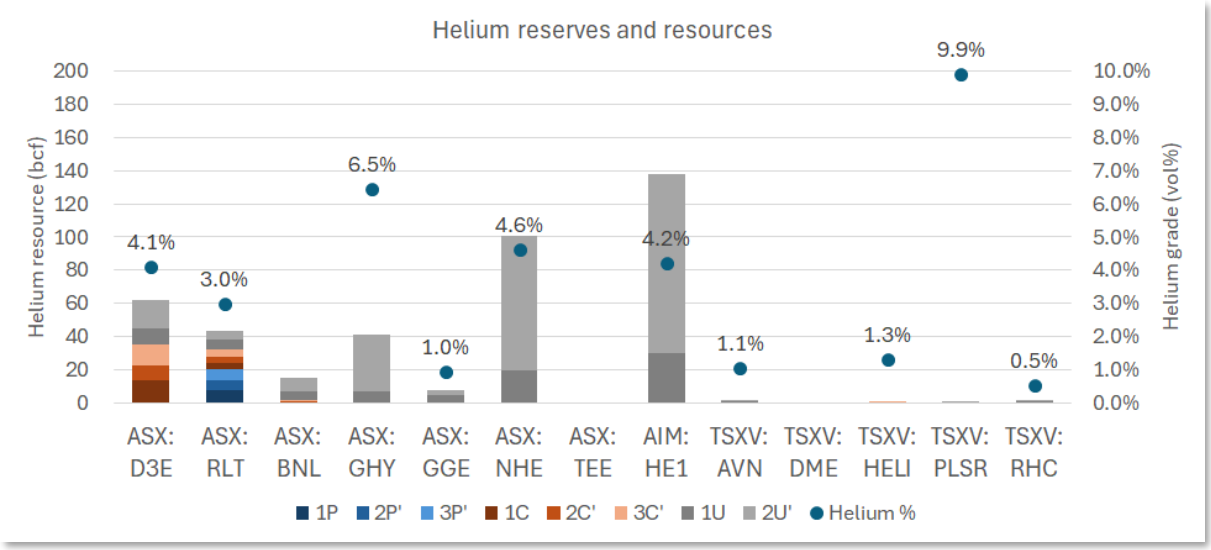
Source: K1 Capital analysis of company and public domain information. Assumed costs as of 1 Jul 2024.

[33] https://bowmanslaw.com/insights/upstream-petroleum-resources-development-bill-potential-impacts-on-upstream-oil-and-gas-companies/, 5 May 2021
[34] Deloitte, "Oil and Gas Taxation in South Africa," Feb 2016; EY, "Global Oil and Gas Tax Guide 2019," Jan 2019
[35] EY, "Worldwide Corporate Tax Guide 2023", https://www.ey.com/en_gl/tax-guides/worldwide-corporate-tax-guide
[36] Republic of South Africa Government Gazette, "No. 28 of 2008: Mineral and Petroleum Resources Royalty Act, 2008
[37] Global Energy Monitor, "Secunda–Durban Lilly Gas Pipeline," 26 Jun 2020.
[38] Renergen Limited, "2021 Update on the Estimation of Methane and Helium Reserves and Resources", Sep 2021, p 40
[39] Helium One, "121 Presentation", May 2022, p 13
[40] Noble Energy, "Noosa Mining Conference presentation", 17 Nov 2023, p 17
[41] Renergen Limited, "Investor Presentation", Jan 2022, p 10. He density = 4.791 kg/kscf
[42] Renergen Limited, "Circular to Renergen Shareholders", 1 Feb 2023.

5.2 Peer comparison

Renergen is currently the only small company with helium reserves and only D3E and Renergen have material contingent resource estimates. Prospective resource estimates for the two companies focused on Tanzania are very large, however, exploration is still at an early stage and conversion to contingent resources and reserves is yet to occur. The helium resource quantities for the North American focused companies are small in comparison to the African focused companies and the North American grades are lower. However, some of the North American companies are in production and others are close to producing and they exist within an active industrial consumer market.

Figure 10 Peer comparison – net reserves and resources



Source: K1 Capital analysis of company data. Contingent and Prospective resource quantities are unrisked.

Table 6 Enterprise Value to Resource metrics (helium price equivalent basis)

Company	Code	Last Price 26-Aug-24	Total Shares (million)	Mkt Cap M$A	EV M$A	2P Helium price equivalent basis bcfe'	2C bcfe'	2U bcfe'	EV/2P $A/kscfe	EV/ (2P+0.8*2C) $A/kscfe	EV/ risked 2PCU $A/kscfe	Gearing D/(D+E) %
D3 Energy Ltd	ASX: D3E	0.165	121	20	11	-	33.2	40.1	-	0.43	0.37	-
Helium (12)				**523**	**595**	**22.8**	**25.7**	**449.4**	**4.57**	**6.04**	**5.05**	**14**
Renergen Ltd	ASX: RLT	1.030	30	31	104	22.8	24.2	135.2	4.57	2.47	1.87	71
Blue Star Helium Ltd	ASX: BNL	0.005	1,945	10	9	-	0.9	13.4	-	12.43	4.20	-
Gold Hydrogen	ASX: GHY	0.715	160	114	99	-	-	53.6	-	-	18.38	-
Grand Gulf Energy Ltd	ASX: GGE	0.005	2,607	13	11	-	-	7.4	-	-	14.55	-
Noble Helium Ltd	ASX: NHE	0.065	475	31	33	-	-	100.7	-	-	3.27	12
Top End Energy Ltd	ASX: TEE	0.100	87	9	6	-	-	-	-	-	-	-
Helium One Global Ltd	AIM: HE1	0.034	5,316	180	163	-	-	138.0	-	-	11.84	-
Avanti Helium Corp.	TSXV: AVN	0.192	93	18	20	-	0.2	1.1	-	120.24	72.80	14
Desert Mountain Energy C	TSXV: DME	0.290	90	26	22	-	-	-	-	-	-	-
First Helium Inc.	TSXV: HELI	0.049	153	8	8	-	0.3	-	-	37.00	37.00	-
Pulsar Helium Inc.	TSXV: PLSR	0.580	105	61	58	-	0.0	0.1	-	7,593.22	4,098.23	-
Royal Helium Ltd	TSXV: RHC	0.066	349	23	64	-	0.2	1.3	-	490.99	245.19	64

Commodity	units	Price 26-Aug-24	Energy or vol units/boe	Price $US/boe	Energy or vol factor	Price factor	Source
USD/AUD forex	$US/$A	0.6720		-	-	-	Reserve Bank of Australia
Brent	$US/bbl	79.60	1.00	79.60	1.000	1.000	Bloomberg
WTI	$US/bbl	75.42	1.00	75.42	1.000	0.947	"
Henry Hub	$US/mmBtu	2.01	5.80	11.66	0.172	0.146	"
Sth Africa nat gas	$US/mmBtu	8.55	5.80	49.60	0.172	0.623	est. field gate price @ $US80 Brent
Hydrogen	$US/kg	3.75	43.13	161.72	0.023	2.032	est. EU import price
Helium	$US/kscf	390	*5.63*	*2,196*	*0.178*	27.589	USGS Mineral Comm Summary 2024
Carbon Dioxide	$US/kscf	32	*5.63*	*180*	*0.178*	2.264	PLSR.V 21 Aug 2024 resource report

Source: K1 Capital analysis. Prices as of 26th August 2024. Contingent Resource volumes are risked at 80%; Prospective Resource volumes are risked at 10%. Value assigned to methane, hydrogen, helium and carbon dioxide.

6. Investment risks and SWOT analysis

D3E is a junior gas and helium company, operating in a country with an elevated degree of political risk compared to North American and Australian based competitors. Key technical and commercial risks relate to field performance outcomes, domestic market demand and community support.

Table 7 Investment risk summary

Risk	Comments
Asset diversification	▪ Multiple permits, but effectively single jurisdiction, single geography/geology, which creates some concentration risk. ▪ Multiple permits provide scope for multiple farm-out / project funding options.
Project maturity	▪ Exploration / appraisal stage. Development and production some years away. ▪ Gas flowed to surface, reducing resource risk.
Exploration / appraisal outcomes	▪ Resource quality and well performance (permeability / flow rates / EUR). ▪ Schedule.
Funding	▪ D3E will require continued equity funding for G&A and exploration and appraisal until sufficient revenue from gas sales is achieved ▪ Potential to partner with others for gas processing / CNG / LNG / helium.
Commercialization options	▪ Limited domestic gas market / pipeline network, but strong regional demand. ▪ Negotiation of acceptable gas offtake agreements (volume, duration, pricing to support project funding and FID) yet to be finalized.
Competing projects: natural gas	▪ Two multi-tcf natural gas discoveries in offshore Block 11B/12B by Total (45%, op), Qatar Petroleum (25%), CNR international (20%), Main Street/Africa Energy (10%). Brulpadda (discovered Feb 2019) 2.8-5.5 tcf GIP, Luiperd (Oct 2020) even larger. These are 70km from a pipeline that connects to the Mossel Bay GTL plant (~300 MMscfd feed, ~35 kbd products). Potential for reversal of the Lilly Pipeline (Secunda to Durban, via Richards Bay) for LNG imports.
Competing projects: helium	▪ Planned expansion of production from Qatar (RasGas) and Gazprom (Amur LNG, Siberia); possible expansion of Renergen (South Africa); possible production from Iran (North Dome (Qatar) / South Pars (Iran) field).
Access to infrastructure (opportunities)	▪ Lilly gas pipeline (23 PJ/yr, ~60 TJ/d capacity), ~260 km. ▪ Existing CNG and dual fuel (CNG/diesel) market for transport fuel. ▪ Emerging LNG market for transport fuel. ▪ Eskom power stations (potential for co-firing).
Community acceptance	▪ Will require social licence to operate for development and production stages. ▪ Local community understood to be supportive of exploration stage.
Country risk	▪ Limited domestic gas market and early-stage petroleum regulatory framework ▪ Moody's country investment risk rating of Ba1 (non-investment grade) ▪ Country investment risk premium of 4.5% (Australia 0.0%) (January 2024). ▪ Coface country risk assessment C, business climate assessment A4 (A1=very low, A4 reasonable, B fairly high, C high, D very high, E extreme).
Legislative changes	▪ Potential exists for permits to be covered by fiscal stability agreements, which prevent changes to existing licence conditions (it appears this feature is hard to access[43]). ▪ Draft legislation announced in Jan 2020 proposes a 20% interest for state-owned partners, carried to the production stage, and a 10% interest for broad-based Black economic empowerment (B-BBEE) companies.

Source: K1 Capital analysis

[43] https://bowmanslaw.com/insights/upstream-petroleum-resources-development-bill-potential-impacts-on-upstream-oil-and-gas-companies/

Table 8 SWOT analysis summary

Strengths	Weaknesses
▪ Large contiguous well-located permits ▪ Large contingent and prospective helium resources ▪ Low-cost drilling ▪ Operatorship, 100% equity interest ▪ Well located with respect to gas demand (power generation, transport, etc.) ▪ Limited competing land use (grazing, cropping) ▪ Good topography; relatively low value land (plateau >1,600m above sea level). ▪ Strong in-country relationships, generally supportive local community ▪ Ability to stage development.	▪ Subdued investor sentiment towards natural gas exploration (stronger interest in helium) ▪ Will require ongoing funding for pilot programs, ongoing exploration and field development ▪ Country risk. ▪ Relatively immature petroleum regulatory regime ▪ Relatively immature gas and independent power generation sectors ▪ Limited domestic helium demand; will require exports for monetization.
Opportunities	**Threats**
▪ Supply direct domgas users, power generation and gas to liquids. ▪ Introduction of strategic partner(s) via farm-down or gas offtake agreement(s) to provide funding and commercial validation.	▪ Exploration/appraisal outcomes. ▪ Potential opposition to onshore development by local or special interest groups. ▪ Cost overruns / schedule delays. ▪ Delays due to political unrest / changes of government. ▪ Delays to pilot programs due to downhole complexity / regulatory processes. ▪ Competitive response from existing natural gas market participants, potential new entrants in natural gas and helium markets.

Source: K1 Capital analysis

7. Corporate overview

Figure 11 Board and Management

Board
Greg Columbus (Non-Exec Chair) Greg has over 30 years' experience in delivering oil & gas projects and involvement in M&A activities. He is currently a Director of Clarke Energy, Galilee Energy (ASX: GLL) and was Non-executive Chairman of Warrego Energy (ASX:WGO) until its recent acquisition by Hancock Group for ~$440m.
David Casey (MD & CEO) David is a geologist with over 30 years' experience in oil & gas exploration and production. He was the MD of Eastern Star Gas Limited (ASX: ESG), which was acquired by Santos for $924m in 2011; MD of Galilee Energy (ASX: GLL) and Talon Energy (ASX: TPD), and CEO Australia and Asia Pacific at Warrego Energy (ASX: WGO).
Matt Worner (ED) Matt is a lawyer with experience in the oil & gas industry in legal, commercial and board roles. He was previously director of Talon Energy (ASX:TPD).
Management
John Zetzman (Technical Manager) John has over 30 years' experience working in oil & gas exploration. He was integral to the identification and application for the exploration right now held by Renergen, which is now the first onshore Production Right in South Africa.
Marek Ranoszek (South African Director of Motuoane) Marek has over 30 years' experience in oil & gas exploration and production, serving as MD and country manager for Anadarko, Pioneer Natural Resources and Total Energies in South Africa.
Paul Young Paul is a geoscientist with over 35 years' experience in oil & gas exploration, predominantly in the UK North Sea.
Gerard Ryan (Engineering and Operations Manager)

Source: D3 Energy Limited website, accessed 8th July 2024

8. Appendices

8.1 Peer companies

8.1.1 Renergen (ASX: RLT)

Renergen is D3E's closest peer, with natural gas and helium assets adjoining D3E's permits in South Africa. Renergen was awarded the first onshore petroleum Production Right in South Africa for its Virginia Project in 2012. It commenced production of LNG in September 2023 and liquid helium in April 2024. The LNG is used in South Africa and the helium is exported.

Phase 1 of the Viriginia project has a nameplate capacity of 2.5 TJ/d LNG (45 tpd, 16 ktpa) and 310 kg/d (113 tpa) of 99.999% (Grade 5) liquid helium. Phase 2 plans to increase capacity to 34.4 TJ/d LNG (625 tpd, 228 ktpa) and 4,200 kg/d (1,533 tpa) of helium from September 2027, requiring ~350 additional deviated wells.[44] Renergen's planned Phase 2 production of 4,200 kg/d helium is equal to 0.32 bcf/yr, equivalent to 5% of current global supply. Its 2P reserve life is ~42 years and its 2P*80%2C reserves and resources are sufficient for over 60 years of production.

Renergen has contracted multiple 10-15 year helium offtake agreements for more than 50% of the plant's Phase 2 capacity, with the balance to be sold in the international spot market. The liquid helium agreements are USD denominated and increase annually at US CPI. Renergen's spot tender in 2022 was reported by various parties at US$875/kscf helium. Renergen expects to contract a majority of the LNG on 5 to 8 year take-or-pay agreements, servicing the industrial, logistics and potentially gas to power industries.

8.1.2 Blue Star Helium Limited (ASC: BNL)

Blue Star is a helium explorer with 311,569 gross acres (226,450 net acres) leased in Las Animas County, Colorado, USA. It has six project areas: Galactica, Pegasus, Argo, Enterprise, Galileo and Voyager, which are located within 250 km (150 miles) of multiple helium purification facilities, and with access to downstream consumers, such as semiconductor manufacturers.

Voyager Project: In October 2023 Blue Star's Voyager discovery (0.64 bcf 2C Contingent Resource at 8.8% He) was targeting first helium output in Q4 2023 via a third-party processing facility. In early January 2024 contingent resources were increased to 0.38/0.86/1.57 bcf 1C/2C/3C respectively. However, in March 2024 Blue Sky advised that the leased processing plant had been placed on hold following testing of the BBB#33 and Bolling #4 development wells.[45,46,47,48] Testing indicated compression and vacuum would be required earlier in field life than previously anticipated, reducing recovery per well and increasing operating costs. In April 2024 Blue Star announced the existing development plan was no longer being pursued and other potential commercialisation pathways were being considered.

[44] Source: Renergen Limited, "2024 Annual Report", 28th June 2024, p 15.

[45] Bolling #4 gas composition was reported as 4.1% helium, 83.1% nitrogen and 12.8% carbon dioxide, with the helium concentration increasing as the test progressed.

[46] Voyager gas processing services were to be provided by IACX, with a total field and plant opex of $US100-120 /kscf gaseous helium product net to Blue Star at full capacity of ~44 MMscf/yr (38 MMscf/yr net to Blue Star after ~15% royalties), with development to require twenty wells. The 98% purity helium gas was to be sold via tube trailer.

[47] Voyager plant performance assumed raw gas feed rate of 2.0 MMscfd at 8.0% He, helium recovery of 90% at 98% purity and plant service factor of 95% => 2.0 MMscfd * 365 days/yr * 8.0% He * 90% recovery * 95% service factor = 50 MMscf/yr. Reported output of 44.4 MMscf/yr includes an allowance for ramp-up.

[48] 12.5% royalty for US BLM leases, 20.0% royalty for State of Colorado leases, 12.5% for private leases.

Galactica/Pegasus Project: This project, discovered by Blue Star in 2022 (2-6% He, 40-70% CO_2), is targeting first production by end 2024, producing helium and carbon dioxide via a leased plant or third-party processing. Food/beverage grade carbon dioxide is expected to be contracted for fixed-price offtake with large beverage corporations, dry ice manufactures, regional distributors, and others. The adjoining Red Rocks helium project, owned by Desert Eagle Operating, commenced production in February 2023 via a midstream leased process facility, with production of ~400-500 kscfd at 6% He from two wells.[49]

8.1.3 Gold Hydrogen Limited (ASX: GHY)

Gold Hydrogen is exploring for natural hydrogen and helium on the Yorke Peninsula in South Australia. It has one granted exploration permit (PEL 687) and seven application areas, covering ~75,000 km^2 in total. It also has four gas storage exploration license applications (GSELA) covering 8,107 km^2 within the renewable energy zone of PEL 687. The Ramsay-1 and 2 wells were drilled in Q4 2023, reporting hydrogen and helium concentrations of up to 95.8% and 17.5% respectively (at 531 m and 777 m in the Ramsay-2 well). Gross 2U prospective resources are estimated at 1313 kt hydrogen and 41 bcf helium (at 6.1-6.8%), with geological chances of success of 22% and 17% respectively.[50] Flow rates have not yet been determined. Extended flow testing is planned for Q2/Q3 2024. The exploration permits are in agricultural areas and will require significant landholder and community engagement for further exploration and potential future development.

8.1.4 Grand Gulf Energy Limited (ASX: GGE)

GGE is a US-focused junior ASX energy company with existing oil production (~140 bopd from the Desiree field, onshore Louisiana) and a 77.5% % interest in the Red Helium Project (RHP), with the right to increase to 85% by drilling a third well. The RHP comprises an area of mutual interest (AMI) spanning 250,713 acres on the border of Utah and Colorado. The project is analogous to the Doe Canyon field, located 25 km (15 miles) to the east that is producing ~365 kscfd of helium, with estimated ultimate recovery of ~3-5 bcf of helium.

GGE estimates a gross unrisked P50 Prospective Resource (i.e. 2U) of 12.7 bcf. Six historical wells drilled for hydrocarbons have proved trap, seal, reservoir and a working helium system, with the only two wells analyzed for helium confirming its presence. The Jesse-1A discovery well tested at 1% He at 1 MMscfd raw gas (10 kscfd He), from a well-pressured reservoir (2465 psi) on trend with the initial pressure of the Doe Canyong field. The Jesse-2 well tested at 0.9% He at a 2.5 km (1.5 mile) step out.

The project is connected by pipeline to the Lisbon Helium Plant ~33 km (20 miles) to the north, with whom GGE has a gas sales and processing agreement. The Lisbon Plant comprises a 60 MMscfd treatment plant and 45 MMscfd cryogenic plant processing up to 1.1 MMscfd of helium, sold as gaseous helium via tube trailers. The plant is working to reinstate its liquefaction capacity of 550 kscfd of 99.9995% purity helium, shut down since 2013 due to limited helium supply. The plant also processes carbon dioxide and is reported to be well advanced to qualify for carbon capture tax credits under Section 45Q (revenue) of the US tax code (the Inflation Reduction Act (2022) provides up to $US85/tonne CO_2 sequestered).

8.1.5 Noble Helium Limited (ASX: NHE)

Noble floated on 8 April 2022, focused on helium exploration in Tanzania, with four projects (Eyasi, Manyara, North Rukwa and North Nyasa) located at the intersection of the Tanzanian Craton and East African Rift System (EARS). Noble's work indicates average helium concentrations from hot springs

[49] https://www.akapenergy.com/post/red-rocks-helium-production-augurs-well-for-blue-star

[50] The chances of development were reported at 48% and 60% respectively, given a combined project risk (Pg and Pd) of 10% for each commodity.

and gas wells of 7.4%, much higher than the US average of 0.3%, with concentrations increasing with depth. Noble's 100% owned licences cover >2,500 km^2, with a further ~2,500 km^2 under application.

North Rukwa Project has an independently certified, unrisked mean Prospective Resource of 175.5 bcf helium. Noble drilled two wells, Mbelele-1 (total depth 400 m) and Mbelele-2 (TD 764 m) in the Mbelele shallow target adjacent to Lake Ruka in 4Q CY23, encountering up to 2.4% helium. The reservoirs are reported to have high permeability and porosity with high flow potential. Initial indications are that the balance of the gas is nitrogen and hydrogen, with no CO2 or hydrocarbons. An appraisal well is planned for drilling in Q3 2024 to test the probable gas cap at Mbelele-1 and Lake Beds reservoirs encountered in both Mbelele-1 and Mbelele-2.

The Mbelele gas cap is very shallow, starting around 85 m depth, with an estimated gas column of 10-20 m. If Noble's Mbelele well test is successful it estimates it could design, construct and install a helium liquefaction plant in 24 months, with the gas separation and liquefaction plant funded by its gas offtaker and repaid through gas sales. Field development would need to be funded separately.

8.1.6 Top End Energy Limited (TEE)

TEE is an exploration company focused on oil, natural gas, hydrogen and helium in Queensland (Adavale Basin), the Northern Territory (McArthur, Beetaloo and South Nicholson basins) and Western Australia (Amadeus Basin). TEE seeks to minimize its carbon footprint through carbon offsetting and carbon capture and storage (CCS).

TEE floated on 4 April 2022 to explore for conventional gas in 100%-owned ATP 1069 in the Adavale Basin in central Queensland and a 50% interest in 30 permit applications in the NT, with shale gas and conventional gas potential. It has acquired additional permits and extended its interest to include hydrogen and helium potential in permits EP 153 and 154 on the northern margin of the Beetaloo Basin in the Northern Territory. The company believes EP 144 in the untested South Nicholson Basin could also be prospective for hydrogen and helium. Exploration work to date has been limited to 2D seismic, soil sampling and airborne gravity gradiometry data. Drilling of an exploration well in ATP 1069 (Queensland Adavale Basin) in late 2024 is expected to require farmout.

8.1.7 Helium One Global Limited (AIM: HE1, OTCQB: HLOGF)

Helium One listed on the London AIM exchange in December 2020. HE1 is a helium explorer with three prospecting licences covering 2,840 km² in similar areas to Noble Helium, on the margin of the Tanzanian Craton and the East African Rift basins. The three project areas, Rukwa, Eyasi and Balangida, are located near surface seeps with helium concentrations ranging up to 10.6% He by volume.

Rukwa hosts independently verified (SRK-2020) Best-Estimate Unrisked Prospective Recoverable Helium Resource (2U/P50) of 138 bcf. HE1 drilled the Tai-1/-1A and Tai-2 wells in 2021, with multiple helium shows. The Tai-3 well drilled to 1,448 m in 2023, sampled 0.8% He from the Lower Karoo. The Itumbula West-1 well drilled in January 2024 to 961 m flowed 4.7% He and 2.2% H_2 to surface. An extended well test ($US10m) is planned for Q3 2024. Development contemplates membrane separation and pressure swing absorption, producing compressed helium into tube trailers.

The Eyasi and Balangida projects are early-stage exploration projects. Gas seep analysis in 2015 and 2022 found helium concentrations up to 4.3% and 10.6% He from thermal springs respectively.

8.1.8 Pulsar Helium Inc (TSXV: PLSR, OTCQB: PSRHF)

Pulsar is focused on helium occurrences not associated with hydrocarbons, with two current projects: Topaz, located in the Mid-Continent Rift Zone (MCRZ) in Minnesota, USA and Tunu, located in Liverpoolland in Greenland. Helium was discovered at Topaz in 2011 with a nickel exploration well encountering 10.5% He at 542 metres (1,1778 ft), with 73.8% CO_2, 13.2% nitrogen and 2.4% hydrocarbons. The Jetstream #1 appraisal well flowed gas at 13.8% He in February 2024, the highest

recorded level in North America, between 533-671 metres (1,750-2,200 ft). Pulsar has leases over 2,089 net acres surrounding the discovery well and an option until October 2024 on a further 2,092 net acres. Further applications have been submitted to the Federal and State Governments for additional areas of interest. Resource estimates are currently being prepared.

Pulsar is currently the only helium explorer in Greenland, with 2,816 km2 (~685,000 acres) on the east coast, ~4 days sailing time from Europe.[51] Greenland is a European Union (EU) overseas territory and helium is on the European Commission's list of critical raw materials. Gas analyses from hot springs have identified helium contents up to 0.8% that are not associated with hydrocarbons (93-97% nitrogen, with minor argon and oxygen content). The project area is outside the Northeast Greenland National Park and RAMSAR wetlands, with year-round access by air and seasonal access by boat.

8.1.9 Royal Helium Limited (TSXV: RHC)

Royal Helium is a Canadian helium producer, with over 1,000,000 acres of helium permits in southern Saskatchewan and southeastern Alberta, with four projects in development. Royal's Steveville Helium Purification Plant (100% Royal) is ramping up to name plate capacity of 15 MMscfd from two wells, with capacity of 22 MMscf/yr of 99.999% helium and up to 20 MMscf/yr of food grade CO_2 and 2.9 kbbl/yr condensate, with material potential for carbon credits. Royal has a sales agreement with a major North American space launch company at a fixed price of >$C700/kscf. Payback is expected within two years. Gross unrisked 1C/2C/3C contingent resources range have been estimated at 43.1/169.1/331.3 MMscf at 0.43-0.53% He, with Royal retaining an approximate 95.75% interest. Royal acquired Steveville via the acquisition of Imperial Helium Corp announced in May 2022.

Royal's 40 Mile project has significant potential for high flow rate helium flowrates (1.1% He), with drilling planned for 2024. In Saskatchewan Royal has 870,000 acres and has drilled seven wells, all with commercial helium grades (Climax - 4 wells, 0.35-0.60% He; Val Marie (43% interest) - 1 well, with 4 further wells planned; Ogema - 2 wells, 0.60-0.76% He). Royal's helium reservoirs are carried primarily with nitrogen and hence are considered "green" (relative to helium sourced from natural gas).

8.1.10 Desert Mountain Energy Corp (TSXV: DME; US OTCQX: DMEHF; Frankfurt: QM01)

DME is engaged in the exploration, development and production of helium and natural gas properties in the U.S. Southwest, including the West Pecos Slope Abo Gas field (188 producing wells on 77,000 acres) in New Mexico and over 100,000 acres of leases in the Holbrook Basin, Arizona. DME is currently relocating a helium processing plant from Arizona to the West Pecos project, where helium concentration is ~0.5% and raw gas rates are currently ~1 MMscfd. The intention is to produce 99.995% purity gaseous helium.

DMW has drilled five wildcat helium wells and three offset wells in Arizona and discovered four high grade (4-7% helium, with77-90% nitrogen) helium fields. Production at the McCauley field has faced delays due to permitting issues. Production will require well stimulation. DME plans to generate revenue from the 3,600-panel solar farm through the sale of electricity.

DME's secondary focus is developing hydrogen assets in the McCauley Helium Field in Arizona, by manufacturing ammonia in partnership with Beam Earth Ltd.

8.1.11 Avanti Helium Corp (TSXV: AVN; OTC: ARGYF)

Avanti has helium assets in SW Saskatchewan in Canada, and Alberta, Canada and Montana, USA. Avanti is targeting helium production in late Q3/Q4 2024 from the Sweetgrass project (221 MMscf He net 2C at 1.1% He and 97.5% nitrogen, with 1,152 MMscf He net 2U) and has signed a helium

[51] Aarhus, Denmark ~2,500 km at 16 knots

processing agreement with IACX to build a processing plant. IACX currently operates thirteen discrete helium purification facilities in six states in the U.S. and one Canadian province.

Initial capacity is planned to be 10 MMscfd raw gas, producing ~22 liquid ISO-tainers (99.999% purity) in 2024, with expansion in January 2025 to 15 MMscfd from the existing two wells, producing ~44 ISO-tainers per year. Avanti expects total tolling and transportation costs of $C211/kscf in Year 2, $C177/kscf in Year 2 and $C163/kscf for Years 3 to 7 of the agreement.[52] Avanti's net interest ranges from 91% to 87% of contingent and prospective resources.[53] We estimate total production of ~38 bcf raw gas over seven years, equivalent to 421 MMscf helium gross (~376 MMscf net to Avanti), or 27% of mid-case contingent and prospective resources.

In Saskatchewan 84 wells have been drilled since 2016 on surrounding properties, with 25 wells in production, producing 450 kscfd helium in September 2023. Avanti expects helium concentrations of ~1.0%, with work focused on seismic acquisition and interpretation to identify drilling locations.

8.1.12 First Helium Inc. (TSXV: HELI; OTCQB: FHELF; FRA: 2MC)

First Helium is a Canadian company exploring and developing the 100% owned Worsley Helium Project in Alberta, Canada. The Worsley project covers 53,000 acres, with exposure to helium, oil, natural gas liquids and natural gas. Four wells have been drilled (helium discovery well, drilled in 1999 (1.3% He, 26% N_2, 65% natural gas, at 2 MMscfd), two oil wells and a horizontal helium development well). Further drilling is planned during H2 2024. Nearby wells have yielded ~0.83-0.88% He. First Helium has a ten-year take-or-pay helium sales agreement (with the first 5 years firm price) with a global industrial gas supply company, with 20% volume availability for direct sales. The project has gross mid-case unrisked contingent resources of 12.6 bcf natural gas, 372 kbbl NGLs and 323 MMscf helium, and is connected by pipeline to a natural gas processing plant. First Helium is currently seeking financing to build a helium extraction plant.

First Helium's project economics suggest lease operating costs of ~$C1.50/kscf and a transport and natural gas basis differential of ~$C0.90/kscf, giving a cash margin excluding helium of ~$C2.25/kscf produced gas. Helium operations indicate additional cash opex of $C1.30-1.75/kscf produced gas (for total cash opex of $C2.80-3.25/kscf produced gas). Helium revenue assumes a ~$C50/kscf quality/transport delta vs the helium marker price, for 95% minimum gaseous crude helium. Drilling, completion and tie-in costs are estimated at ~$C3.3m/vertical well to ~1,900 m depth, with capex of ~$C56-59mm to install a helium processing facility (~20 MMscfd raw gas capacity).[54]

[52] https://avantihelium.com/post-details-one/Avanti-Helium-Announces-Binding-Midstream-Agreement-For-Helium-Production-For-Sweetgrass-Helium-Pool

[53] https://avantihelium.com/post-details-one/1-Avanti-Helium-Announces-Significant-Updated-Resource-Estimate-for-Greater-Knappen

[54] Estimated from https://www.firsthelium.com/images/pdf/presentation/2024/FIRST_HELIUM_-_Corporate_Presentation_July_2024.1.pdf, pp 10-11

Disclosure:

This report was commissioned by D3 Energy Limited (D3E) and K1 Capital Pty Limited (K1 Capital) will receive a fee for preparing this report. The purpose of the report is to provide an assessment of the value of D3 Energy Limited. The user of this report is D3E and persons designated by them. K1 Capital has prepared this report based on interviews with D3E's management and research using publicly available information. K1 Capital has not undertaken a site visit to D3E's projects. To the best of K1 Capital's knowledge, full, accurate and true disclosure of all material information was provided by D3E. Given the potential for a perceived conflict of interest it is K1 Capital's policy not to include a share price target or investment recommendation for commissioned research. K1 Capital may seek to do business with companies covered in its reports. Consequently investors should be aware that K1 Capital may have a conflict of interest that could affect the objectivity of its research. Please see the final page of this report for further information on disclosures and disclaimers.

K1 Capital overview: K1 Capital was established in 2016 as a specialist provider of research, analysis and corporate advisory services, focused on oil & gas and the broader energy sector. K1 Capital operates under its own AFSL which covers the provision of research to wholesale clients.

Analyst background: John Young has over 40 years' experience in the petroleum, resources and financial services industries with ExxonMobil, WMC Resources/BHP Billiton, Wilson HTM and Ord Minnett, with qualifications in engineering (BE hons), applied science (MAppSc), operations research (GradDipBusSc), management (GDM) and finance (GradDipAppFin).

****

K1 Capital disclosures

Disclosure: K1 Capital is the trading brand of K1 Capital Pty Limited, Australian Business Number (ABN) 25 614 078 714, AFS Licence number 493121. K1 Capital Pty Limited and/or its associated entities, directors and/or its employees may have a material interest in securities referred to in this report, or may provide services to, or seek to do business with, companies referred to in this report. Hence investors should be aware that K1 Capital Pty Limited or other such persons may have a conflict of interest that could affect the objectivity of this report. Investors should consider this report as only a single factor in making their investment decision.

The analyst discloses that when conducting on-site visits to inspect company assets the analyst may receive assistance from the company or companies involved. This assistance may include transport, accommodation, incidental expenses, and the provision of safety equipment. The analyst has not conducted a site visit to the company's operations or offices.

This document is current at the date of the issue but may be superseded by future publications.

Disclaimer: Whilst K1 Capital Pty Limited believes the information contained in this communication is based on reliable information, no warranty is given as to its accuracy and persons relying on this information do so at their own risk. To the extent permitted by law K1 Capital Pty Limited and its associated entities accept no liability for any loss or damage caused by any error in, or omission from, this document. Any projections contained in this communication are estimates only. Such projections are subject to market influences and are contingent upon matters outside the control of K1 Capital Pty Limited and therefore may not be realized in the future.

This document is not an offer to buy or sell or the solicitation of an offer to buy or sell any security or instrument or to participate in any trading strategy.

This document is intended to provide general financial product advice only and has been prepared without taking account of your objectives, financial situation or needs, and therefore, before acting on advice contained in this document, you should consider its appropriateness having regard to your objectives, financial situation and needs. If any advice in this document relates to the acquisition or possible acquisition of a financial product, you should obtain a copy of, and consider, the Product Disclosure Statement, prospectus or other disclosure material for that product before making any decision. Investments can go up and down. Past performance is not necessarily indicative of future performance.

This research is for written for "wholesale clients" within the meaning of Section 761G of the Australian Corporations Act 2001 (Cth), including "sophisticated investors", "experienced" and "professional investors" (as defined in Section 708(8), 708(10) and 708(11) of the Act).

Analyst Certification: The analyst certifies that the views expressed in this research accurately reflect the analyst's personal views about the subject company, its assets, securities or issuers; and no part of the analyst's compensation was, is, or will be directly or indirectly related to the specific recommendations or views expressed herein.

****